

RECORD

Descriptive passages telegraphed 1947
B. Deacon

Collection and Field Note Book

No. 19

(March 21, 1947 - June 3, 1947)

1947 Cinchona Expedition

(27168 --- 27658)

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Items on a 99 map 1:1000000
to be checked

on N.C 16 & 17 are two
provinces in Costa Rica
both called Puntarenas

on N.C 16 the boundary
bet. Prov. Heredia and Prov. Alajuela
as it crosses saddle bet.
Volcan Poas & V. Barba is
marked as a straight n.s.
line, but is said actually
to follow road.

on N.C 17 Cerro Cambutal
is 4750 feet.

Cerro Tuto should be Cerro Tute
Cerro Gaita & peaks
around El Valle run
up to 1200 m.

79° 35' 5 mi. west
summit 79° 45' 3 mi. west
madden 79° 45' 3 mi. west
Dam Rd.

79° 35' 5 mi. west
summit 79° 45' 3 mi. west

Paul Allen

Note

- No Blanks for Mexico,
see 27168 (19) and book 22
- general Guatemala Blankarnings
(VA)
- where about mining nos? (see cards in book 19,
and parallel marks)
- 27216 p. 52 to north Guatemala
- Start with 27290 (p. 70, 19) and complete Costa Rica
- ✓ Panama p. 104 (19) localities should be checked
on 1955 map (bamboo sheet)
- Colombia p. 106 (34)
- ✗ ~~Ecuador p. 118-120 no Blanks?~~
p. 124 - OK
- What are rd L in books 20? ^{→ (specimens left in} ^{specimens left in}
^{lino, send them}
^{labels)}
- ✗ ~~How about plants retrieved in 1957??~~
- Where are ~~Argo~~ Blanks (for books 20, 21?)
- Books 21, what does ^{specimen left in} ^{Argo} ^{send}
[↑] ^{label?}
- Blanks for 27659 - ? 28028 ? mining
- 27673 ✓ ? ~~28098 - 28105~~ "
- 27739-43 ? 28193 - 977
- ~~27739-42 ?~~ ~~28211-28322 ?~~
- ~~27744-50 ?~~
- ✓ 27912, ~~27912-92~~

Book 21

flat writing? w and p 128
Haworth 28323-28409? 28458 - 92 florals were
printed wrong
28712 - 28736? missing
all figs etc, w/ids made

Book 22

OK esp. Brazil

Collection nos:
27168 - 27658

F. R. Fosberg
Collection book #19

Nos. 27168 - 27658



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1947 Cinchona Expedition

Left Washington at 8:00 P.M.
March 21 via B & O.

Illinois 1947

March 22 - crossing
southern Illinois via B. + O.
R.R. bet. Vincennes & ~~Hummer~~
- (from letter to the Evans) -

"just a little while
ago we crossed the Wabash
River. It is quite a
majestic stream this
far down. And there really
are sycamores. Here the
country is rather flat,
with corn-fields, but
not too flat or too con-
tinuous corn-fields. There
are patches of woods, wooded
bottoms, and wooded
knolls - all deciduous
woods here. Back in
Ohio and Indiana were
scattered junipers and
even pines. Surprisingly,
though it is sunny and
warm there is no sign
of spring yet. Not a
leaf has appeared, nor
a flower. Last year
when I came across
here about a week
later red-buds and

1947 Illinois

many other things were in full bloom. This year is really late. It is queer to see such sunlight on such a completely leafless landscape (except for dry oaks and bush leaves still persisting). The fields of *Andropogon* add a touch of rich pinkish tan here and there. Big oaks are scattered in the fields. Thickets are scattered along the fences and in depressions. Some parts of the middle West might be quite pleasant to live in."

Texas

March 23 - Missouri Pacific line from St. Louis to Laredo via Palestine, Austin + San Antonio.

Before reaching Palestine is a red soil country ~~so~~ dominated by pines of several sp. Deciduous areas down this far show little or no signs of spring except noticeable swelling of buds. South of Palestine almost immediately spring was evident. Trees were beginning to leaf out. Several wild-flowers were in bloom.

Near Taylor, northeast of Austin, forests of oaks, largely evergreen oaks, but mixed with deciduous, and junipers became very evident. *Tillandsia festoons* occasional trees. This continued to Austin. *Melia azederach* is common

along roads and near houses. *Cercis* is occasional and in full bloom. *Prunus americana* (?) is common in the thickets.

Crossed Rio Grande to Nuevo Laredo just before midnight Mar. 23.

1947 Mexico - Nuevo Leon

Argemone albiflora very common in disturbed fields.

Mar. 24 - near Monterey flats and valley floors are ~~are~~ covered by a scrubby thorn forest with much *Prosopis glandulosa*, *Acacia farnesiana*, *Condalia* (?), *Ceanothus* (?) (large dense tree with white fls.), *Yucca* (an arborescent form with rather long drooping ~~stems~~ infls.), *Opuntia phaeacantha* (var aff.), *Croton* (?), and various other things. *Agave americana*

The mountains are of sedimentary beds, often very much tilted, bare, dry, with a thin desert vegetation. No coniferous or mesophytic vegetation seen from train.

Some parts of the valley floor above Monterey badly eaten by large herds of goats.

Hunnemannia mexicana local in valley floor near rr. track well

above Monterey.

near 1st small siding
up valley from Mont.
enter extensive flats
of *Larrea* with
several *Opuntia* ^(O. microdasys?)
+ small *Prosopis* bushes
a tiny agave sp.

Above this the valley narrows
abruptly and goes thru a
small canyon with a
stream, *Salix* sp. etc.

Then opens out into
extensive desert flats again.

With even slight increase
in elevation the composition
changes rapidly.

Around settlements
Eucalyptus, *Casuarina*,
Tamarix, *Nicotiana glauca*.

Various additional cacti
(*Cylindropuntia*, *Echinocactus*, etc.)
come in with altitude. as
do many other shrubs.

At the foot of the
mountains cacti are
abundant so the whole
landscape is a veritable
cactus-garden.

Further up, the
canyon bottoms are
cultivated - gardens
and patches of grain.
The canyon walls are,
in places so covered
by a small agave, as
to look ~~to~~ from a distance
like grass. Still further
up, the canyon bottom
is filled with *Salix*,
along a small stream.

Around Saltillo the
flat valley bottoms
are cultivated. *Populus*
is the characteristic
tree.

In Saltillo *Casuarina*,
Cupressus (2 sp.), *Ficus canina*,
Fraxinus, and various
other things are ~~not~~ cultivated.
The *Casuarinas* are all
dead after reaching 1-1.5 m.
diam.

Above Saltillo are
vineyards, also walnut
groves, but also much

1947 Mexico

overgrazed and eroded land - some lake bed formation very seriously cut into straight sided barrancas. Stock are not abundant because so little is left to eat.

Barley is raised in flat places where irrigation is possible.

Some miles above are extensive flats with Lantana, great patches of the same tiny Agave, and unbranched arborescent Yucca 1-3 m. tall. Quite a few cacti. A number of cacti incl. an Echinocactus with bright red spines. One oasis of Populus and irrigated fields toward the head of this.

Above this the vegetation changes as the m. goes up a narrow valley to Cárneros. Nolina.

Large still covered in
yuccas. Then
it goes up
into a
valley
with
more
yuccas.

1947 Mexico.

Junipers, Berberis and Ephedra become common. The small agave and Yucca are still dominant, cacti abundant and of various kinds. Nolina at some spots dominates. Above this the valley broadens again into a lake bed then narrows among rounded hills.

Some cultivation here and there, but too little water. Not obvious at this season what is being grown.

The yuccas almost universally have the leaves cut off - the distal third or half. No evidence as to what does it; but almost universal. At one place people were seen harvesting leaves of the small agave but not apparent what for.

Lanata

Above this, on the slope, around another large lake bed, in Larrea - Yucca - Nolina - Opuntia - grass vegetation another huge sp. of Echinocactus like T. grusonii, seen, along with the red-spined cespitose one seen before. Here also a low matted straw-spined Opuntia common. Another rather short but broad-leaved Agave here.

Further along the R.R. crossed a large lake bed. The slopes are dominantly Larrea, but the flat is dominated by a large Opuntia like O. prolifera - ~~and almost beat out~~ this is abundant also up into the Larrea surrounding this.

On the plateau are enormous flats of Larrea, here and there dominated by forests of branching

arborescent Yuccas. No noticeable admixture of F. lourteana. Depressions here and there with different vegetation but none close enough to see what it is. General vegetation composition very simple here. Higher parts with a tall Cylindropuntia common.

South of Vanegas jet. is an extensive flat of mixed Atriplex and Larrea. ~~much~~ Further south, in more or less the same sort of country Echinocactus molle is scattered over the flats. It is not apparent whether or not it is native, as not far away at Catorce it also grows around houses.

South of Wadley Sta. the w. slope of the mts. to the east appear covered by piñon pines, but too far away to be sure.

Not far north of San Luis Potosí a dense candelabra-like *Cereus* becomes common. Various *Opuntias* and locally *agave* are co-dominant with *Cereus*. Locally *Prosopis* is dominant or even exclusive.

Just a little further on a *Cereus* (*Lophocereus*?) becomes common, but especially around village where it is used as a living fence.

Mar. 25 - from 100 to 40 km. n. of Mexico City. Plateau land with gray soil - Plantations of perhaps 2 sp. of gray agaves. Flats usually cultivated. *Lchinus mollis* is perhaps the most common tree - growing spontaneously everywhere - many large old trees. *Prosopis* also common - flowering abundantly. *Opuntia* of *megacantha* type also abundant.

In villages *Eucalyptus*, *Cupressus* (gray sp.), *Baileya*, etc. common, as well as *Lchinus*, *Prosopis*, *Opuntia*, etc. *Populus*.

About 100 km. n. The slopes are covered abundantly with a candelabra-like *Cereus*.

As Mexico City is approached the flats are more and more cultivated, villages

more common.

The slopes are very universally over-grazed. The surface layers of soil are long since gone. At this season the grass is very dry and eaten to the ground.

Close to Mexico, the Agave plantations even climb the slopes.

Phoenix canariensis
Platanus sp.
Magnolia grandiflora
Ficus carica

Mar. 25-27 Mexico City

Plants cultivated in parks, gardens, along streets, etc.

Fraxinus sp. dominant
Washingtonia filifera
Ligustrum (evergreen)
Phoenix dactylifera
Chamaerops
Plumbago auriculata
Punica granatum
Nerium ~~oblonga~~ *indicum*
Eucalyptus globulus
Eucalyptus sp.
Cedrus libani
Dracaena draco . . .
Cupressus sempervirens
Cupressus benthamiana?
Chamaerops sp.
Poa annua (lawn)
Bellis perennis (in lawn)
Lehmannia molle
Hedera helix
Pelargonium (ivy geranium)
Jasminum (yellow)
Bougainvillea glabra
Cotoneaster pannosa

March 28 - Trip by rail from Mexico to Uriapan (casual observations from train window).

At Dos Ríos (2645 m.) the forest is Pine-oaks. Above this *Cupressus* sp. and *Pseudotsuga* ^{alba} (?) sp. become important and even dominant.

Farming here is carried out on steep slopes, and is good contour farming, semi-terraced, with contour rows of agave.

A high meadow ~~was~~ is at Lalayan, surrounded by *Pines*-*Pseudotsuga* ^{alba} ^(mostly) forest (photos). ^{beginning at} ^{ocolluan}

From here on the country is a series of lake-beds, probably of volcanic ash, with mountains, largely dead volcanic cones, between them.

The railroad goes from one to another of these. The largest is that where

Toluca is located.

They are much like the Sabana de Bogotá in Colombia. They are essentially open, either pastured or cultivated, where pastured usually seriously overgrazed, sometimes even miniature bad-lands topography.

Along shallow ravines with water or wet ground, *Salix* sp. is common along these and around villages.

Below Tepenango the valley becomes rocky (lava), and *Opuntia* (*Platyopuntia*) spp. become dominant, with a small red fld. *Erythrina* like *E. herbacea* conspicuous.

Maravatia (2013 m.) is in another great lake bed, this one green and cultivated. Below Maravatia the plain becomes dry and supports a sparse woodland of *Acacia*, *Prosopis* & *Opuntia*. (End of roll #1, b+w. Panatomic)

Below Acambara there is a sparse woodland of arborescent *C. pumila*, another unidentified tree, *Bursera* sp., & *Prosopis*.

From here on there is a curious habit of storing fodder in *Prosopis* trees, probably to keep it out of reach of animals.

At Huings is Laguna de Cuixío, a large lake surrounded in most parts by broad *Distichlis* flats or *Scirpus lacustris* (recl.) flats, then by luxuriant *Prosopis* forests on the flats. The soil looks alkaline, with white deposits in the cultivated parts. The *Scirpus* was being harvested.

From above Quirio to well below Charo the flat meandering valley bottom is quite luxuriant. Parts are cult. and along streams and sloughs *Taxodium* and *Salix*, as well as *Quercus* *Fraxinus*, etc. are common. The

Taxodium is especially along the water and is beautifully covered by *Tillandsia usneoides*. The appearance is quite like s.e. U.S. No birds ever seen from train. At Charo were a couple of trees of *Salix* of a narrow columnar form, as *S. chilensis* in G.A.

Below Moralia are dry volcanic hills, grassy and over-grazed, with brushy canyons that look as though the flora might be interesting.

Below this the rocky slopes and low hills are dominated by ~~a~~ *Yucca*, *C. pumila* & an unident. tree. The valley floor is very green. Below, oak forest gradually opens.

Beyond Pataguaro are pine-oak or pine forest - very nice tall forest with little undergrowth. Dead volcanoes are numerous.

The season is very dry everywhere, and dusty.

March 29 - Uruapan and vicinity. Surrounding Uruapan is a volcanic plateau, varying from 1600 to 1800 m. alt. liberally sprinkled with small extinct cones. The river Cupatitzio arises in a large spring, practically within the city, called Rodillo del Diablo, from a mark like a knee print in the rock. It has cut a large canyon to a depth of 150-200 m. in the plateau. The river is a beautiful abundant stream of water, fed by springs all along. 1

Canyon below ~~the~~ waterfall.

27168

27168 Drymaina
var. on rocks in bottom of

Several miles below the city is a beautiful waterfall, called Salto de La Paracua. Here, in addition to the fall of the main river, the amphitheater formed by it is surrounded at the head by a curtain of small falls from a stratum which gushes water.

The plateau is mainly an open forest of at least 2 sp. of *Pinus* (one looking like *P. palustris*, the other glaucous and shorter needles). The canyon walls are covered by oak forests mixed with other things. The country is very dry at this season. The rains are said to begin in May.

spreading mat, rooting at nodes

March 29 Paracho

This town does a great deal of wood-work - turned articles. The wood used is an arbutus (called Madroño) which is common in the pine forest bet. here and Uruapan. The ~~wood~~ wood, in short logs about 4 dm. long, is boiled in water before turning so it won't crack. It is dull pinkish and takes a good polish.

The trip from Uruapan to Volcán Paricutín takes about 1½ hours by car. First part over paved highway, then a rather poor branch dirt road. The general ~~wood~~ vegetation is pine forest with clearings and meadows here and there. The country is dotted with extinct cones. After a time (just before "Las Cruces" camp areas of ash appear. Even

near Uruapan there is a thin blue-gray coating of ash all over the ground. But here it is so thick that on the flat places it has killed all herbaceous vegetation. The pines and such shrubs as oaks, Crataegus, Lenesio, etc. are not evidently injured. From here on ash becomes more abundant.

The ~~good~~ taxi-driver (Sam Ruiz - good man, speaks English, educated in Nogales, Ariz. with "litis de auto y Buses" Paricutín.) told me that the Tarasco Indians had planted wheat and maize in this ash, with curious results. The maize grew, but produced no ears. The wheat yielded more than a normal crop.

The road ends near the edge of an extensive lava flow, several miles

from the volcanos. This flow covers a great extent of territory, and destroyed 2 villages, Panecutin and Santa Rosa (?). The church tower of the latter sticks up in the middle of the flow. 4000+ people were made homeless and some killed. All of the lava seen is aa. The moving flow seen at about ~~1~~ $1\frac{1}{2}$ miles from the cone moved imperceptibly the evidence being a continual breaking of the rocks at the edges, crumbling off, the heat in the vicinity, and many glowing places at night. The flows seem to come from the base or even somewhat away from the base of the cone. On the north and west sides, at least the vicinity of the cone is completely covered by the flows. Several hills in their path have had

their trees killed, the completeness varying with distance from the cone. These hills are deeply covered with ash, which may be what killed the trees. The last plants to drop out are Crataegus, Senecio and a large bunch grass - in the order named - the grass persisting on some slopes away from the cone ~~as~~ closer than anything else. The skeletons of the trees are everywhere when the ground is not covered by lava.

At a distance from the cone trees are still alive quite close to the edges of the flows.

There is complete devastation over an area of a number of square miles. The lava seems, on an average 6 m. or more deep, and

it is hard to tell how deep the ash is, but in one place a gully was cut about 2.5 m. into it.

The volcano sends forth continual explosions with great clouds of ash, occasional showers of rocks, which either fall back into the crater or roll down the slopes of the cone. The variation in intensity is marked, but ash seems to be continually sent forth. How such continuous energy and such enormous quantities of material can be emitted over such a period of time is not evident. At the present time the cone is comparable in size with about the average of those around about. It is not ~~now~~ erupting as intensely as formerly, but there is still plenty of activity.

Mar. 31 - Trip by highway from Uruapan to Mexico.

Crosses four main high ridges, to the south of the railroad. One is just above Uruapan. Here the forest is *Pinus*, ~~and~~ *Arbutus* north and *Quercus*, with pine dominant.

Bet. Morelia and C. Hidalgo is a great highland, with pines and firs.

The general dryness is less marked here, and many things are in flower - *Fuchsia*, *Lobelia*, etc. This would repay exploration.

The highland west (bet. *Zacapu*, ^(bet. *Zacapu*, *Toluca*) *Toluca*) of the *Toluca* plain, is similar but not so high or luxuriantly forested, at least where the road crosses it.

The one just west of Mexico has extensive fir forests, almost pure.

March-April - Trip by rail (Ferrocarriles Mexicanos) from Mexico City to Vera Cruz. This route gives a fine transect of eastern Mexico.

North of Mexico City the fact that ~~El Valle de~~ Mexico is an old lake bed is obvious. Here is an extensive marshy area with ditches and rows of willows. Then is ~~over~~ an enormous flat area largely devoted to maiz culture. Enormous areas are on this flat and run slightly upon the base of the nearly ^{dead} volcano ~~de~~ (7,170) cones. After a while some of the land is open, but still large areas are devoted to maiz production.

Near the edge of the plateau, before Esperanza are pine-oak forests, rather sparse.

Going over the edge beyond Esperanza, the m. skirts along just below the

top of the rim, through a moist region of bushy mixed forest, with pines with peculiarly drooping needles. Great number of things in bloom. As lower altitudes are reached, the region becomes drier, until the bottom of a large valley, at middle altitudes, is quite dry, at this season with little vegetation. Then another escarpment is reached, and the vegetation is a tropical one. Sugar cane is important at the base. From here the plain extends to the sea. The moist sugar cane region gradually changes to thorn forest (or rainy-green forest). It is mostly bare now. A tree nopal is found here.

April 2 - Isthmian R.R.
from Vera Cruz to Suchiate

At Vera Cruz are sand dunes, then low-lying brushy land that is rather moist - water table close to the surface. This soon turns to palm-savanna or palm-thicket. Several palms become very common, incl. a tall labal. Bromelias sp. common.

With only slight increase in alt. palms become scarcer and a "rainy-green" forest, largely of legumes as Enterolobium, Gliricidia etc., broken by cult. patches is dominant. It seems about half leafed out. The abundance + species of palms varies. There are also large stretches of grassland or savanna, where are some stock. From the number of burned patches I suspect this is maintained by fire. It does not seem

overgrazed. In places palm thickets dominate.

After Guayabo the country becomes a true palm savanna, on high dry ground, dominated by a tall labal. There are some other trees + shrubs, mostly legumes. The grass is dry. There are epiphytic *Cereus* (or *Cyphellum*) in the palms.

(end of Kodachrome roll #1,
here near Piedras Negras)
(several photos of palm savanna, etc. bef. Piedras Negras + Madereros, several of river + of Enterolobium at Piedras Negras. End of roll #3.)

After about Joaching, the palm savanna gives way to a dry forest, in places, largely of Enterolobium, + with palm-scattered, in places abundant, but with many other things.

Occasional sloughs are covered with *Pistia stratiotes*.

As we approach Tierra Blanca the forest becomes greener and more luxuriant. Along streams it is well developed and of large trees.

After Tierra Blanca this forest, though dense, becomes very broken by clearings and burns. Burning seems to be common practice.

After Papaloapan the forest develops into a thick jungle - probably second growth, tangled with vines and shrubs. Much is cleared.

Near Loma Bonita are fields of pineapples, mostly with maize growing in them.

A large river-bottom just $\frac{1}{2}$ of Loma Bonita. Broad bottomland, much of it cleared and grown up to brush, but large

trees along the river and in the uncleared parts.

Winding sloughs.

white herons. Much of the brush seems to be *Psidium*.

Beyond Arroyo Claro is broken forest - large trees in patches - the open country between having been burned but mostly not ~~so~~ recently, and domin- ated by a curious sedg - a *Scirpus* or *Pynchospora* - with a dense brown panicle. Some of the trees look like oaks but the altimeter only says 300 ft.

Beyond Agueta is tall jungle, very dense in places and largely palms - ^{above} thicker than anything so far, with enough canopy where it has not been disturbed to make the undergrowth thin.

Around Isla is a vast open plain, partly dominated by the sedges mentioned above, part ~~by~~ planted to well kept pineapple fields. The pineapples plants vary in color from bright blue-gray to reddish yellow, the fields being more or less uniform. There are ponds here and there, with ^{white} herons. Southward it gets more and ~~more~~ more bushy, but in patches. Uncultivated grants have certainly been burned, probably often.

April 3 - bet. Arriaga and Tonala, on the Gulf of Tehuantepec, the coastal lowlands are covered with dry forest, largely *Bursera*. Much is cleared and cultivated.

At Tonala more fruit is to be seen for sale along

the r.r. than anywhere so far in the lowlands. There were pineapples, bananas, mangos, sapodillas, a smooth, somewhat elongate white fleshed melon with practically no sweetness or flavor, but refreshing, a wrinkled, rather large fruited spondias called ~~the~~ "ochoa" and a small yellow tasteless fruit whose identity was not obvious. *Mansoa Bunchosia*?

South east of here the forest becomes true thorn-forest, with *Pithecellobium dulce* dominant at first, then becoming more mixed. *Caesalpinia pulcherrima* apparently wild, not common.

This in turn gives way to a dry mixed forest, in places largely palms.

Batis maritima flats and mangrove swamps (poorly developed) line the ocean, protected by spits.

Mar. 3 3 am. n.w. Andes,
bet. Tonala & Pijijiapan, Chiapas

27¹⁰ 8 weedy
in thickets along railroad
in dry forest

The lowlands gradually become moister toward the south east, the forest more luxuriant, until beyond Pijijiapan it becomes swampy, with stretches of open marsh filled with *Panicum*, and pools with *Pistia*, inhabited by great flocks of white (and darker) herons. *Triplois* is an important tree, except in wet places.

The area looks more prosperous. The people healthier and happier. Much fruit offered for sale.

wine flowers large,
purple within whitish
without (seed sample)

Back of these lowlands is a range of rather high and definitely interesting-looking mountains. They vary in distance from the coast, from quite close to 5 mi. or more, and arise from the coastal plain abruptly.

As we get toward Mapastepec the trees get larger - some *Ficus* being positively immense when the forest is not dense. Gradually a tall lowland forest, with *Tabebuia*, *Cecropia*, *Bursera*, *Ficus*, etc. covered with aroids and vines develops. It is not a rain forest but is definitely a jungle.

Between Mapastepec and Tapachula bananas are grown commercially for shipment by rail.

Castilla rubber trees are occasional and have been tapped.

Xanthosoma, looking much like the Pacific one, but becoming caudescant is common. Leaf shape extremely variable, incl. basal lobes.

Great areas of cleared swamp with Heliconia and the silver-leaved marantaceas.

In Tapachula is a Piper with oblong leaves and erect spikes, a tree with trunk 15 cm. diam. common along streets, though probably not actually cultivated.

~~1947~~ April 6 - Finca El Naranjo, south slopes of Volcan Santa Clara, 12 km. s. w. of ^{de} Lago Atitlan, Depto. de Suchitepéquez
 $90^{\circ}19' \text{ w.}$ $14^{\circ}36' \text{ n.}$ 1170-1250 m.

Steep slopes here have been cleared for planting of Cinchona. The forest was evidently once quite thick. The soil is good and the drainage good.

In a small patch of young Cinchona was observed a colonial spider - a tremendous mass of webs strung between and enveloping the trees, with thousands of spiders of all sizes. Specimens were collected.

A scale is rather common on the under side of the leaves of Cinchona. It is a thin yellow one. The damage to the Cinchona is not conspicuous. (specimens collected.)

40 1947 Guatemala
 ⑧ 27169 *Salvia*
 cultivated about houses, as
 ornamental.

5 70 *Polygala*
 weed in open grass around yards

5 71 *Conyza* det. J. Cuatrecasas
 weed in cinchona plantation, open.

3 72 *Cinchona*
 planted, not shaded

5 73 *Paspalum*
 common weed in cinchona plantation
 partial shade.

5 74 *Cinchona*
 planted, not shaded

5 75 *Borreria laevis* (Lam.) Griseb.
 common weed in cinchona
 plantation, partial shade

5 76 *Richardia scabria*
 common weed in cinchona
 plantation, partial shade

5 77 *Conyza*
 weed in cinchona plantation
 partial shade

41
 Suchitepéquez

low rounded bush, calyxes
 deep crimson, corollas
 light crimson.
 roots with wintergreen
 odor, flowers white.
 heads yellowish.

small tree, 4 m. tall,
 flowers leave dull
 green with reddish
 midrib; flowers somewhat
 fragrant, cream-white.
 spreading, depressed
 clump.

small tree 5 m. tall,
 leaves dull green,
 reddish on petiol, midrib
 & veins; flowers cream-
 white, somewhat fragrant
 flowers white

spreading, flowers
 pinkish white.

flowers yellow,
 heads zygomorphic.

27 77? grass
weed in cinchona plantation,
shaded.

6 79 Calamus? or ~~Calamus~~
was weed in Cinchona
plantation, shaded thicket

7 80 ~~Act. ill.~~
weed in Cinchona plantation
shaded.

8 81 Diastatia
weed in Cinchona plantation, shaded

9 82 Cinchona
planted, not shaded

1 83 Euphorbia
rare weed in cinchona plantation

1 84 Cinchona
planted,

2 85 Pandan?
weed in opening in Cinchona plantation

1 86 Carex?
rare weed in cinchona plantation
in opening

2 87 *Centradenia floribunda* Planch var. *floribunda*
(det. Wurdack 1968)
weed on cultivated
barley in cinchona plantation.

creeping, forming a thin
mat, panicle erect.

lastiferous, flowers
bright crimson, anthers
blue-black.

flowers white

fls. lavender

small tree 5 m. tall, leaves
green; flowers white.
glands white.

small tree 4 m. tall,
leaves subglossy, midrib
reddish.

tufts, culms spreading
flowers white

leaves purplish beneath,
flowers rose colored.

apr. 7

27188 *Cinchona pubescens* var. *succinifera*
cultivated on sunny slope

289 *Cinchona pubescens* var.
cultivated on sunny slope

90 *Cinchona calisaya*
cult. in plantation, not shaded

91 *Cinchona calisaya*
cult. in plantation, not shaded

92 *Cinchona calisaya*
rare in bottom of gulch

93 *Hoffmannia*
occasional in ^{under} brush in bottom
of gulch

94 *Cinchona* (hybrid)
planted, not shaded

95 *Cinchona* (hybrid)
planted, not shaded

stem scarcely 4 sided. scarcely glossy.
seedling 2 m. tall, sterile,
leaves green with red petiole
& midrib; stipules erect.
from Ecuador

growing beside #27189, not
as vigorous.

seedling 2.5 m. tall, leaves
green, glossy, veins strong,
red; stipules divergent
at tips, stiff. stem 4 sided.
from Costa Rica

growing beside #27188, more vigorous.
small tree, ~~to~~ 5 m. tall,
leaves dull, veins red.

small tree 5 m. tall;
leaves ~~dark~~ somewhat
subglossy, veins reddish.
prostrate shrub 1 m.

long, flowers purple.
sparsely branched
straggling shrub; flowers
greenish yellow.

small tree 4 m. tall;
leaves dull, green.

Exp. Pl. #293G.

small tree, 4 m. tall; leaves,
dull, green.

Exp. Pl. #251 P.I. #104267

27194 *Cinchona* (hybrid cal. x sec.?)
cult., not shaded

5 97 *Phyllanthus*
weed along trail

2 98 *Adiantum*
cut bank above trail

6 99 *Lycopodium*
cut bank above trail

27200 *Lobelia*
common in openings on
slopes, and along trails

5 01 *Dioscorea*
twining on small *Cinchona* tree
at edge of planting

Apn. 8

2 02 *Cinchona*
cult., not shaded

5 03 *Cinchona* (hybrid)
cult., not shaded

small tree 5 m. tall, leaves
glossy, turning very red.
branches naked.
Exp. Pl. # H-2492-G

erect, fl. greenish
frond pendent.

erect

erect, sparsely branched,
1.5 m. tall, flowers
orange-red.

vine, twining to right,
floriferous for almost
entire length.

small tree 5 m. tall,
leaves dull; said to
be "succinifera" but possibly
not pure. Infls. ^{on branches} without
leaves when old.

tree 8 m. tall; lvs. rather
dull, dark green; flowers
pale pink (pubescens type, with
strongly recurved lobes), fragrant
but unpleasantly so.
Exp. Pl. # N163.

27204 *Cinchona pubescens* var. *succinifera*
planted on commercial scale

✓ 05 *Tournefortia*
along trail in canyon

✓ 06 *Cinchona* (hybrid)
cult. not shaded

✓ 07 *Cinchona* (hybrid)
cult. not shaded

✓ 08 *Cinchona*
cult. not shaded

1

Los Andes, up in pt

April 10 - Finca Panama,
south base of Volcan Atitlan.

Virgin rain forest, the lower
part largely cleared for
coffee plantations. The soil
is largely a sand-like
volcanic ash resulting
from an eruption of V. Atitlan
about 1830. There is a strip

small tree 5 m. tall, sterile.
the typical "succinifera" of the
plantations. Leaves dull
satin above.

shrub 3 m. tall; flowers
green, fruit not mature.

small tree 4 m. tall, leaves
green. Typical of the "hybrids"
that segregate out from "Lederia"
seed) NH 339

tree 6 m. tall, leaves green.
Z 51 G

sterile small tree 4 m. tall,
leaves dull.

the so-called African *succinifera*.
Aug. 11. # Z 662 to (note few veins).

of pine forest running from above
middle altitude on the mountain
down to about 1000 m. that is
said to have come in on ash
after the eruption. There is
no other pine on the ~~far~~ Pacific
slope in Guatemala and this is

said not to have been there before the eruption.

The slopes between 1200 and 1400 m. are being cleared of their virgin forest of tall trees for cinchona plantations.

* * *

27209 *Acalypha*

6 weed in hedge near dwelling

2 10 *Asplenium*

on mossy rock in stream,
wet by splashing water

#

in tall wet forest being cleared

11

on tree trunk, rare

In the afternoon was observed a remarkable congregation of the bird called the "ayaguan". These birds flew in, ~~from~~ principally from the south, for some little time, gathering in an enormous whirling column, many hundreds of feet high. This was said to be preparatory to departure for the north, and was said to occur always at the beginning of the rainy season. I did not see them go, but a few minutes later they were gone.

14° 32' N 91° 18' W

1230 m. shrub 2.5 m. tall

1250 m. dark green.

1340 m.

frond leathery

27212

4. common component of

4. 13 Polyppodium
epiphytic on tree trunks in

5. 14

6. 15

7. 16

Loranth
parasitic on undetermined
sterile tree in

8. 17

epiphytic on tree trunks in

9. 18

epiphytic in

10. 19

floraea
common

11. 20

epiphytic on branches of tall tree

12. 21

epiphytic on branches of tall tree

13. 22

in Peperomia
common on branches of tall trees

14. 23

Hedysarumnia
epiphytic in1340 m
↓tree many m. tall, with
a creamy latex that turns
reddish orange on exposure
to air.fronds stiff but weak
treetree, fruit fleshy, red
when ripe, longitudin-
ally rugose.
dark greenleaves gray, bracts
coral red, flowers blue-
violet.clump, with abundant
aerial roots, flowers
purple red,
tree 25 m. tall, fruit red.

flowers whitish

flowers pale greenish
with reddish center.prostrate, leaves fleshy;
rarely fertile.vine-like, sterile,
sub-fleshy.

in Cindora plantation

1380 m

2724 *Phyllanthus*

open clearing

6 25 *Dymenia undata* (Willd.)
on logs and ground under tree2 26 *Cindora ledgeriana*3 27 *Cindora ledgeriana*3 28 *Acaphyphy*
weed in.

1

x Apr. 12 Guatemala City,
Guatemala

Am. 5

29 *Pinguicula*cult. in pan of water from
plants brought in from wild*Polygonum*-like in appearance.

cliff face; fls. white.

pedicels very sticky, even
when in flower.

small tree 5 m. tall, lvs. dull.

small tree 4 m. tall, leaves
dull, flowers white,
somewhat fragrant.1250 m erect shrub 1.5 m. tall,
leaves purple beneath.

4 April 13 - below Concepcion Panola
headwaters of Rio Pinula, 7 km. e.s.e.
San Jose Pinula, 23 km. e.s.e. Guatemala
Canyon bottom with rocky
cliffs and brush along
stream margins
partly cultivated 1450m

27230 *Calliandra*
steep brushy bank

5 31 open pebbly stream margin

32 *Euphorbia*
open pebbly stream bank

33 *Richardia*
open pebbly stream bank

9 34 common in thickets

5 35 *Quercus*
in thicket near stream

5 36 *Senecio thomasi* Klatt det. J. Cuatrecasas
occasional in thickets near stream

2 37 *Borreria laevis* (Lam.) Griseb.
occasional near stream

8 38 *Pithecellobium*
in thicket near stream

3 39 *Acanthobium*
parasitic on small pine tree

40 *Acalypha*
~~oblonga~~ thicket near stream

city, Guat.

shrub, stamens
red
flowers purple

glands white
prostrate, flower white.

shrub 3 m. tall. flowers
dried up. stipules divaricatae.
small tree 6 m. tall.

erect herb 1-1.5 m. tall,
flowers yellow.
flowers white.

tree 6 m. tall, flowers
pale green.
yellow-green

unbranched

58

1947 Guatemala

27241 *Triumfetta*
weed in thicket near stream

42 *Drymaria cordata*
grassy spot below spring

43 common in thickets

~~44 *Sen*~~

44 *Senecio santarosae* Green. det. J. Cuatrecasas
common in thickets

45 *Senecio petasites* DC. det. J. Cuatrecasas
common in thickets

46 *Cuphea*
talus at base of cliff

47 *Dryopteris*
crevices in cliff

48 *Blechnum*
top of talus at base of cliff

49 *Isachne*
in deep crevices in cliff

50 *Desmodium*
in deep crevices in cliff

51 *Blechnum occidentale*
in crevices in cliff

52 *Cuphea*
top of talus at base of cliff

53 *Polypodium*
in old stone wall

54 *Peperomia*
in old stone wall

59

Guatemala

subfrutescent herb 1 m.
tall, flowers yellow.
prostrate.

shrub 3 m. tall,
panicle rose color, ripe
fruit black.

erect herb 1-2 m. tall,
flowers yellow.

erect herb 1-2 m. tall,
flowers yellow
petals maroon

tuft

seed, petals deep purple
curling up with dryness
more or less prostrate,
flexible.

60

1947 Guatemala

7755 *Guazuma*
common in thickets

7756 *Acalypha*
occasional in thickets near
stream

57

common in thickets on slope

58 *Lantana velutina* var. ^{det. maderae} *violacea* (Nees) ^{maderae} common weed in edges
of thickets on slopes

5

Apr. 13 above Concepcion Pinula
at heads of Rio Pinula, 4 km. e.s.e. San
Jose Pinula, 20 km. e.s.e. Guatemala City,
brushy woods and open
earthy banks on canyon wall

59

openings in brush in small
draw, moist earth.

60 *Fuchsia*

rare in brush

61 *Euph.*

occasional in brush

62 *Rubus*

common in edges of brush

63 *Eupatorium*

common in edges of brush

60

Guatemala

61

shrub 4 m. tall, fruit
green.

shrub 1.5 m. tall, style
red.

shrub 3 m. tall,
flowers greenish flesh
color

aromatic shrub 1.5 m.
tall, flowers long-tubed,
berries purple.

1700 m.

rhizome reddish-green,
lactiferous. flowers green

scandent tangled shrub
1 m. tall; flowers crimson.

shrub, leaves glaucous
beneathly. (possibly = 27270)

liana, no primocanes seen,
flowers pink, fruit black
and sour when ripe.

suffrutescent herb 1 m. tall,
heads white.

62

1947 Guatemala

27264 *Eugenia*
common in bushy woods

65 *Boscomia frutescens*
common in bushy wood,

66 mossy overhanging bank

67 *Psychotria*(?)
rare in bushy woods

68 rare in brush

69 *Blennia*.
rare in brush

70 *Eugenia*
common in bushy woods

71 *Oxalis*.
common weed in openings

72 *Phytolacca*
occasional in openings

73 *Acalypha*
occasional in brush

74 *Bouteloua*
occasional on open banks

75 *Panicum*
abundant on grassy open banks

guatemala

63

small tree ~~6~~ 6 m. tall,
fruit orange.

shrub 3 m. tall,
fruiting panicle pendent.

axil of seed red.

prostrate, pendent,
flowers green mottled
with purple.

drooping shrub 3 m.
tall, fruit fleshy, white.

rounded shrub 1.5 m.
tall, flowers greenish white.

slender shrub 1 m. tall,
flowers whitish.

small tree; flowers
white; fruit yellow.
(specimens from two trees)
subglobose herb 1/2 m.
tall, sepals red, petals pink.

herb 1 m. tall, much branched,
flowers purplish-pinkish-gray,
fruits translucent purple.

slender shrub 1 m. tall,
staminate catkins
yellowish red; styles red.

27216

occasional in brush

77 Myrsine

occasional in brushy woods

78 Salvia

occasional in brush

79 Acalypha

occasional in brush

April 14

Guatemala City, Guat.

80 Eryngium

common weed in lawns

81 Cupressus

common ornamental

This is the dry season here. Rains begin in May. It is so dry that everything is dusty, grass is all dry, and many plants are not in bloom.

The porous volcanic ash soil is especially dry because of the drainage. The region here is an old lake-bed, filled with ash, cut by straight

April 15 - sent flag #4 of
plants, sic to Miami.
Specimens sent to Hobart Institute
not numbered because some plants
not numbered.

shrub 2 m. tall, leaves

flowers generally 6-22 mm.

small tree 5 m. tall,

fruit in mature.

annuals 1-2 m. tall,

small branched, flowers

white.

scrubby, scrubby, ornamentals

cacti and cactus types

scapes spreading to
ascending, heads bluish.
tree 20 m tall

sided "barancas" or ravines.

April 16 - Finca Las Charcas, on
Amatitlan road, just at city
limits of Guat. Dr. Dr. Rafael Lind
have 120 kinds of Eucalyptus, of
which they are actively harvesting
5 for oil. Several are grown
for timber.

Seedlings of Knobell Cind. calisaya
are very unhappy, too dry. Trees 5-8
ft. tall are completely in fruit like a
huge inflorescence, some leafless.

Apr. 17 the hills bet.

Tequigalpa and Valle de Zamorano are rocky - apparently sedimentary - purple and green conglomerate, massive shales, sand stones, etc. The land is so eroded that little soil is left. The lower parts are sparse thorn forest. The upper parts are pines^{and oak}, very well developed at higher levels, sparse at lower.

The top of the road is over 5000' ~~ft~~ in good forest. Mt. Uyaca ~~is~~ over 6000' and is covered by a cap of rain forest. The Escuela intends to buy it for a biological preserve.

One of the pines has 4 or 5 needles (usually 5).

Acacia abundant near the lower edge of the pines resembles *A. farnesiana* but with much larger thorns, smaller, more abundant flower heads.

The agricultural school, Escuela Agrícola Panamericana at El Zamorano, maintained by United Fruit Co., has 3000 acres of land, 1000 of it good valley land. (total investment about \$50,000).

Buildings of stone, very attractive, not elaborate. Living quarters comfortable. The architectural style is very simple, designed by Popenoe and his engineer. The buildings are low, on one floor, with tile roofs & floor, wood ceiling joists and beams, tile roofs, very little ornamentation - only carved ~~stone~~ beams over the entrance. Tile roofs with about 30° slope. The stone is white, rough-cut, flat rectangular.

The climate is harsh & strong dry season, with drying winds. Many things simply will not thrive. (i.e. cinchona, cacao, fevera, etc.). The common ornamental tree is ~~the~~ *Acrocaria mexicana* (?)

April 19 For a few miles south of San José the landscape is very gentle, almost a toy landscape, with mostly coffee plantations and their shade trees, with abundant bananas. South of Paraíso, the land becomes much more mountainous, with spectacular gorges and canyons. This continues to the Turrialba region.

4 Apr. 19 - Quebrada la Tonta, Rio Agul, above Santa Cruz, lower slopes of Volcan Turrialba, above Turrialba, Prov. Cartago
side of deep wooded ravine

527282

83 Cinchona
common on

84 Galium hypocarpium
occasional on cut banks

85 occasional on

Turrialba itself is in a wide valley.

The climate is, in general, wet. This has been a severely dry year, and yet everything is green in the Turrialba area, though around Cartago the hills present a rather dry appearance.

9°59' N
83°48' W

1700 m. (c.)

small tree

tree 10 m. tall, 3 dm. thick, flowers white, mostly gone, heavily fragrant.

vine-like, tangled in bushes, fruit orange, fleshy, shrub 3 m. tall.

27286 *Cinchona*
common on

87 *Columnnea*
epiphytic on tree-trunk

88 *Elaeagia*
common on

89 *Fuchsia* L. var. *lanceolata*
ornamental in yard of
dwelling Det. H.E. F. - May, 1947

April 19 - Santa Cruz, on Rio
azul, lower slopes of
Volcan Turrialba, Turrialba
broken woods along stream
in pasture

90 *Cinchona pubescens*
occasional in

91 occasional in

tree 10 m. tall, 3 dm. thick,
flowers mostly gone, white,
heavily fragrant.

leaves fleshy, flowers
scarlet.

tree 10 m. tall; leaves
stiff, buds without

3 m. tall; flowers
in clusters pendent.

small tree 3 m. tall,
2 dm. thick, flowers
white within, flushed
with reddish without,
very fragrant.

leaves glossy above, bullate,
veins red. stipules erect
or slightly divergent.

tree 8 m. tall, latex yellow,
sticky; buds rose colored,
said to persist unopened
for months; fruit rare, immature.

9724

100 - 200

✓ 27286 *Cinchona*
common on

✓ 87 *Columnnea*
epiphytic on tree-trunk

✓ 88 *Elaeagia*
common on

✓ 89 *Fuchsia* [var. ?]
ornamental in yard of
dwelling Det. H.E. Carr, 1912

✓ 90 April 19 - Santa Cruz, on Rio
azul, lower slopes of
Volcan Turrialba, Turrialba
broken woods along stream
in pasture

✓ 90 *Cinchona pubescens*
occasional in

✓ 91 occasional in

tree 10 m. tall, 3 dm. thick,
flowers mostly gone, white,
heavily fragrant.

leaves fleshy, flowers
scarlet.

tree 10 m. tall; leaves
thin but stiff, buds without
gum.

shrub 3 m. tall; flowers
crimson, clusters pendent.

9°59' n
83°44' w
1429 m. (m)

small tree 3 m. tall,
2 dm. thick, flowers
white within, flushed
with reddish without,
very fragrant.

leaves glossy above, bullate,
veins red. stipules erect
or slightly divergent.

tree 8 m. tall, latex yellow,
sticky; buds rose colored,
said to persist unopened
for months. fruit rare, immature.

✓ April 20 - 2 km. n.e. of Paraiso
Prov. Cartago
secondary woods on slope
Cinchona pubescens Vahl var.
occasional in

9°51' n.

83°46' w

1500 m. (2)

leaf-cutting ants had almost
defoliated this tree.

✓ 27292 *Cinchona pubescens* Vahl var.
occasional in

tree 12 m. tall, 2.5 dm. thick,
bark very bitter; leaves
rather dull on upper surface,
veins reddish; stipules
erect, short,
flowers white within,
reddish white without,
very fragrant. (bark sample)

✓ April 20 - Finca of Mr. P.H.
Lanckester, 1-2 km. n. of
Paraiso, P. Cartago
cultivated in garden
93 *Sambucus*
low swampy place
✓ 94 *Tournefortia*
low swampy place
95 *Columnnea*
on fallen log.
96 *Hilia chiapensis*
on fallen log
97 *Rhamnus*
in low swampy place

9°50' n

83°53' w

1300 m. (2)

shrub 3 m. tall,
flowers white.
- shrub 2 m. tall, flowers
greenish white. (plant
said to have been here before
garden was made.)
- flower scarlet; leaves
sub-fleshy.
small shrub 1 m. tall,
flowers white, turning
yellowish. (plant from
nearby hills).
shrub 3.5 m. tall. (said to
have been here before garden.)

27298 *Clerodendrum*99 *Vaccinium*

growing in bath house

shrub 3 m. tall, flowers
blue, anthers blackish, rare.
(plant brought from Africa)
~~small~~ ~~small~~ straggling
shrub, flowers pale
coral with pale greenish
tips.

Lat. $9^{\circ}35'N$ Long. $80^{\circ}45'W$ Cerro ~~de~~ Buena Vista

April 20 - (Cerro de la Muerte)

Pan-American highway,

Cord. de Talamanca, Cartago - San José boundary

open páramo-like summit

of range, with brushy patches

3125 m.

27300 *Hedychium*

common in more open places

leaves thick, ^{rather} glossy, white
beneath, flowers white,
purple without, rather
unpleasantly fragrant.

tightly matted to ground,
leaves stiff, ~~leaves~~ flowers
greenish, berries orange-red
tufts, panicles purple

01 *Nertera granadensis*
rare, on open ground

02 occasional, on open ground

27303 *Eryngium*
common on open ground

4 04 *Carex*
common on open ground

6 05 *Erica* sp. det. J. Cuatrecasas
occasional on talus

6 06 *Alchemilla*
~~soes~~ common on talus

2 07 *Solanum*
occasional on steep slope

2 08 *Carex*
occasional on slopes

5 09 *Phytolacca*
common

2 10 *Rycopodium*
occasional on steep bank

11 *Hypericum*
common ~~soes~~

12 *Hedysotis*
common

5 13 *Hypericum*
common

caespitose,
leaves glossy, magne,
white beneath, with
yellowish veins, od. strong,
taste

caespitose; stems
purple, rays white

caespitose, matted
flowers green, ovaries
becoming purple in fruit.
elongate herb; flowers
full purple.

caespitose, culms
spreading, spikes drooping.
herb, densely branching,
up to 1 m. tall forming
clumps; petioles decurrent
as wings on stem; flowers
pink

creeping, stiff.

sub-shrub, somewhat
glaucous-green, flowers
bright yellow.

prostrate, forming dense
carpets, leaves glossy.

bush 1-1.5 m. tall; flowers
bright yellow.

27314 *Clusquea weberbaueri*
common

15 *Pernettya*
common

16 occasional
17 *Bomarea*
occasional

18 *Jamesonia*
common, occurring in large
dense patches

19 *Castilleja*
common

20 *Solanum*

21 *Senecio multivenius* Benth. det. J. Cuatrecasas
common

forming large clumps,
up to 1.5 m. tall; one
clump seen fertile, sterile
and fertile parts of this
specimen from different clump
sub-shrub, forming
large clumps; leaves
stiff, whitish beneath;
flowers white, rare;
fruits purple, red when
mature.

stems red; flowers
bright chrome yellow.
short vine twining in bushes;
flowers red tinged with
dull orange.
branches very erect.

bristly herb up to 1 m. tall; +
bracts scarlet; calyxes
purple edged with chartreuse
corolla chartreuse above,
orange red beneath.

shrub; ~~the~~ flowers purple.
brought to me by someone,

herb 1 m. tall, branched;
flowers bright deep
chartreuse yellow.

✓ 73 22 *Senecio andicola* Turcz. det. J. Cuatrecasas
common

✓ 23 *Lycopodium*
rare on bank

✓ 24 *Acaena*
occasional

✓ 25 *Blacknum*
occasional

✓ 26 *Valeriana*
common

✓ 27 *Senecio verstedianus* Benth. det. J. Cuatrecasas
occasional

✓ 28 *Valeriana*
occasional

✓ 29 *Rubus*
common

✓ 30 *Alchemilla*

✓ 30 *Alchemilla*
very common

✓ 31 *Stellaria*
occasional

✓ 32 *Halenia*
occasional

✓ 33 *Stellaria*
occasional

rounded densely branched
shrub, 1 m. tall; bracts pale
yellow.

spreading herb, branched
at base
acaulis cent

cryptic herb, fls with
unpleasant odor; flowers
white within, purple
without.

erect, 1 m. tall, rays yellow.

flowers purple without,
white within

young cane glaucous;
leaves white beneath;
flowers white; berries
dark red (but perhaps not mature)
forming a mat on ground.
all seen sterile.

prostrate

cryptic, flowers
greenish yellow.

3000 m. pendent

27334 *Nertera granadensis*
abundant on road cut

April 21 - Instituto Interamericano
de Investigaciones Científicas
5 km. S.W. Heredia

3 35 *Uvera laevigata* Wedd.
small patch in low
ground.

4 down April 22 - Atlantic slope
of saddle between Volcan
Barbas and Volcan Poas, near
La Yeguesa de Heredia, ^{just below} Vara Blanca 2100 m. e.
roadside thickets and banks

27336 *Nertera granadensis*
vertical cut-bank in sun
common locally

11 37 *Rubus glaucus*
common in roadside tangles

38 *Drimys*
shrub planted as fence post

pendent; leaves stiff,
strongly crispate; flowers
green; fruit orange-red,
juicy, 2 stones.

955' n.
83° 40' w.

532 m. (m.)

erect, unbranched, 1-1.5
m. tall, spines on stem,
viscously stinging,
leaves purple-beneath.

Alajuelo-Heredia boundary

10° 10' n.
84° 8' w.

plant densely matted,
leaves stiff; flowers
greenish; fruit translucent
red, juicy, stones 2.

bushes up to 2 m. high,
forming tangles,
stems very glaucous;
flowers white; fruits
large, rather sweet,
good flavored, almost
black when ripe. seeds small.
shrub 3 m. tall, bark pungent
to taste; leaves glaucous beneath; fruit black.

April 22 - Isla Bonita,
~~Los Erasarios~~

n. e. slopes of Poas Volcano
 7 km. n. n. w. of Vara Blanca, Prov. Alajuela 337 m. a.s.l.

dense very wet forest
 on slopes, cleared recently
 here and there

27339 *Cinchona* (*Ladenbergia*)

27340 (fl.) common locally in forest

41 *Cleome*

rare, local, this colony
 in wet vegetation near
 base of waterfall

42 *Centropogon*

rare, at base of waterfall

43

in undergrowth

10° 12' N
 84° 10' W.

tree 10 m. tall 2.5 dm. thick
 leaves coriaceous, margin
 slightly revolute, dark
 green, rather glossy above,
 pale beneath, petiole
 and midrib ~~slightly~~
 reddish, flowers white,
 strongly and heavily
 fragrant; mostly not
 in flower and only very
 old fruits

herb up to 1 m. tall,
 rather succulent,
 flowers ^{light} salmon pink,
 fruits purple, terete,
 not quite mature.

flowers vermillion, with
 yellow constricted corolla
 and green lobes.

shrub 2 m. tall, buds
 white (note enlarged calyx
 lobe).

✓ 27344 *Cinchona pubescens* Vahl var.
common in forest, this
tree in open clearing

✓ 27345 10
46 *Gonzalagunia*
occasional in undergrowth

✓ 47 *Cinchona pubescens* Vahl var.
common

✓ April 23 - Finca los Ensayos,
1 km. above Buena Vista de
San Carlos, ^{8 km. n.w. Tapera.} Alajuela

1000 m. (es)

10° 14' n
84° 25' w.

Cleared slopes with
scattered trees and
patches of woods.

✓ 48 *Coimbra ovalis*
persisting in clearing

✓ 49 *Cinchona pubescens* Vahl var.
common in woods, this
specimen from tree in clearing

✓ 50 *Cinchona (Ladenbergia)*
persisting in clearing

tree 8 m. tall, 2 dm. thick
old leaves red, leaves
rather glossy above, veins
green; very few old fruits.

shrub 2-3 m. tall, arching,
flowers white within,
rose without; fruit
white when ripe (specimens
from 2 bushes, one with
ripe fruit.)

tree; flowers pinkish
within and without
(plant brought by boy).

half dead tree, sprouting
from stump.

tree 8 m. tall, 2 dm. thick,
leaves venulose, sub-glossy
above, rugose - bullate,
turning red in age.

sprouts from old stump,
steely.

April 23 - slope above
finca Los Ensayos toward
El Zapote, ^{km.¹⁰} of ~~Barva~~
~~de San Carlos~~, Prov. Alajuela 1400m.

27351

Cinnamomum pubescens Juss. var.
edge of patches of woods,
common.

52

Cephaelis
undergrowth in wet
forest.

The plantation of Menly
& Co. at Los Ensayos is
large, on rather gentle
slopes, appearing
rather dry at this season.
There are about 200
acres planted, in full
sun, mostly ledger,
but some succulenta
and others. There is
considerable disease -
canker and a disease
that attacks from the
tips when the plant
is well grown. They
have suffered much loss

10° 13' N.
84° 24' W.

small tree 3 m. tall,
leaves sub-glossy
above, turning red with
age.

2 line 1.5 m. tall,
bark red, flowers
whitish.

from both. It seems
possible that the canker
is endemic in the rather
common native *C. pubescens*,
which it attacks but
not fatally. This
is well distributed
in a belt from about
3000' - 4500' This attacks
both succ. + ledger. A disease
called salmon bark ~~kills~~
attacks succulenta. The
other tip disease only
attacks ledger.

The plantation at Isla Bonita is in a terribly wet region 200 inches, well distributed. It is cleared from the virgin forest. The trees of all sorts have not made as much growth as I would have expected. There have been serious losses from cancer. This cancer is spotty but widespread in its occurrence. The only areas really free from it are old clearings. This leads me to suspect that it is a disease of the common native *C. pubescens* or of some other rubiaceous native plant. In the clearings the signs have gradually died.

The native variety of *C. pubescens* here has pinkish flowers (only one cluster of very branched ones seen). It is a tree up to 15 m. tall and 3 dm. thick, in a forest 25-40 m. tall. Thus it is a second story tree, but grows in the virgin forest. Seldom does it reach the canopy. This year there seem to be no fruits. Flowering has scarcely started yet. When cut down it sends up vigorous suckers, but few seedlings appear in clearings. When it has been allowed to persist in clearings it has a bedraggled appearance, probably due to exposure, or to leaf cutting ants, which are common and very fond of *Cincloma*.

PLANTS OF COSTA RICA
Prov. de Alajuela

Locality	Det.
hills \approx 3 km. south of SAN RAMON	
Lat. 10°4'5"N, Long. 84°02'W.	
Occurrence	occasional
wet mossy or scarcely moist forest, logged out and decadent, in places very weedy, tangled with vines	
Date	April 24, 1947 Alt. 1200m. (estimated)
Coll.	F.R. Fosberg
Remarks	No.

alajuela

92

1947 Costa Rica

apr. 24 - hills \approx 3 km.
s. of San Ramon, Prov. Alajuela
wet mossy forest, logged
out and very decadent,
in places weedy 1200 m. e.
P.R. 27353
occasional

10°4'5"N
84°29'W.

54 Piper

occasional

55 Piper

occasional

56 Costus

common

57 Polypodium

epiphytic on tree trunks

58 Cuphea ignobilis

common around edges of woods

59 Epidendrum

common, epiphytic on branches

This is the place where, in 1921,
Alberto Brenes first found Cinchona
in Costa Rica. A search, in company
with Brenes, ~~had~~ failed to reveal any
remaining trees.

small
caulif.
up to
to grow
shrub
spit
leaf
shrub
herb
branc
const
branc
yellow

1947 Cinchona Expedition

subputrescent, up to 1 m.
tall, flowers ~~orange-red~~
flower whitish

PLANTS OF COSTA RICA
Prov. de Alajuela

Det.

Locality

hills 2-3 km. south of SAN RAMON
Lat. 10°4.5'N., Long. 84°29'W.

Occurrence *occasional*

wet mossy or scarcely moist forest, logged out and
decadent, in places very weedy, tangled with vines
Date April 24, 1947 Alt. 1200m. (estimated)
Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

PLANTS OF COSTA RICA
Prov. de Alajuela

Cinchona pubescens Vahl var.
Det. F.R.F.

Locality

hills 2-3 km. south of SAN RAMON
Lat. 10°4.5'N., Long. 84°29'W.

Occurrence *rare, one tree seen in*
wet mossy or scarcely moist forest, logged out and
decadent, in places very weedy, tangled with vines

Date April 24, 1947 Alt. 1200m. (estimated)
Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

PLANTS OF COSTA RICA
Prov. de Alajuela

Piper

Det.

Locality

hills 2-3 km. south of SAN RAMON
Lat. 10°4.5'N., Long. 84°29'W.

Occurrence *occasional*

wet mossy or scarcely moist forest, logged out and
decadent, in places very weedy, tangled with vines
Date April 24, 1947 Alt. 1200m. (estimated)
Coll. F.R. Fosberg No. 27353
Remarks *A. Briones* small tree 4m. tall;

ca

1947 Cinchona Expedition

PLANTS OF COSTA RICA
Prov. de Alajuela

Faramea

Det.

Locality

hills 2-3 km. south of SAN RAMON
Lat. 10°4.5'N., Long. 84°29'W.

Occurrence *occasional in patch of*
wet mossy or scarcely moist forest, logged out and
decadent, in places very weedy, tangled with vines

Date April 24, 1947 Alt. 1200m. (estimated)
Coll. F.R. Fosberg No. 27361
Remarks *A. Briones* shrub 4m. tall;

f

1947 Cinchona Expedition

✓ 50
a. Brenes
apr. 24 - hills 2-3 km.
s. of San Ramón, Pro. Alajuela

wet mossy forest, logged
out and very decadent,
in places weedy 1200 m. e.

27353

Pellionia

occasional

54 Piper

occasional

55 Piper

occasional

56 Costus

common

57 Polypodium

epiphytic on tree trunks

58 Cyathia infundibularis

common around edges of woods

59 Epidendrum

common, epiphytic on branches

10°4' ^{aa}
84°29' w.

This is the place where, in 1921,
Alberto Brenes first found *Cinchona*
in Costa Rica. A search, in company
with Brenes, ~~failed~~ failed to reveal any
remaining trees.

small tree 4 m. tall,
cauliflorous, racemes
of rose flowers along trunk
to ground.

shrub 2 m. tall,
spikes erect.

leaves stiff, spikes erect.
shrub 1.5 m. tall.

herb 1-2 m. tall, un-
branched, leaves in a
conspicuous spiral;
bracts red, flowers
yellow.

epiphytic, up to 1 m.
tall, flowers ~~red~~ orange-red.
flowers whitish.

✓ 61 *Brenesia* April 24 - hills 2 km. S. of San Ramon, Prov. Alajuela

10°5' N.
84°27' W.

a. patch of scarcely moist woods, tangled with vines, on a steep slope. 1100 m. e.

27360 *Hamelia patens*
common

61 *Farauna*
occasional

5 62 *Cinchona pubescens* Vahl var.
rare, one tree seen

✓ 63 April 25 - grounds of Instituto
Interamericana de Agricultura,
Turrialba
weeds along roadside

9°55' N.
83°40' W.
532 m. (m.)

63 *Richardia*

64 *Bomarea laevis* (Lam.) Griseb.

5 65 *Emilia javanica* (Burm.) Rob.

✓ 66 *Drymocallis cordata* (L.) Willd.

↑

straggling shrub
up to 5 m. tall; flowers
red, buds orange.
shrub 4 m. tall,
flowers white, fragrant.
tree 3 m. tall, 2 dm. thick,
sterile, old leaves red,
leaves dull to sub-glossy
not very rugose.
(~~spicigera~~ sprouts from
base but 6 m. tall.)

prostrate, flowers white.
erect, flowers white.
flowers red.
prostrate, cymes ascending.

April 26 - From the air the country south and west of Volcan Chiriqui looks densely forested, with many trees devoid of leaves at this season. Near the coast are large areas of mangrove swamp much of it with tall, almost leafless trees scattered abundantly in it.

April 26 David, Prov. de
Chiriqui, Panama

weeds along roadside

27367 *Lantana camara* L.
occasional

68 *Scoparia dulcis* L.
common

69 common

70 *Gomphrena*
common

cultivated in parks

71 *Jasminum*

72 *Pentas coccinea*

North of Puerto Armuelles is a large area cleared and apparently in bananas. From here to David are patches of cleared land.

8°25'N
82°27'W

shrub, m. tall, stems square; flowers orange; fruit green.

flowers pale greenish, 4-parted, hairy within, anther reduced.

prostrate, long stems from strong central root.

prostrate from strong tap root; heads white.

bush, m. tall; flowers white.

herb 0.8 m. tall; flowers crimson.

98

1947 Panama

✓ 1 April 27 - same
 27373 Hibiscus
 cultivated in park

74 5 weed in roadside

75 3 Ixora
 cultivated in garden

76 5 common in fence-rows,
 probably planted as living post.

✓ April 27 - near the airport
 km. s. of David, Panama
 flat ^{grassy} plain with scattered
 trees, mostly *Anacardium*
occidentale

77 5 roadside, on bare soil

78 5 ~~common~~
 common along roadsides

79 2 Croton
 occasional on

80 2 occasional on

Chiriquí

99

shrub 1-1.5 m. tall, branching
 sparse, virgate; flowers a
 rich maroon, almost black
 in center, closed in afternoon.
 caespitose, somewhat
 aromatic herb up to 1 m.
 tall; flowers white.

small tree 4 m. tall,
 flowers white, somewhat
 fragrant; apparently
 does not set fruit here.
 straight tree with
 strong leading shoot
 and drooping branches;

caespitose, flowers
 yellow, closed in afternoon.

flowers yellow.

27381

Anacardium occidentale L.
common in fence-rows and
scattered on plain.

4 82

Richardia
roadside

✓

April 28 - David, Chiriquí
gardens and roadsides

3 83

Boerhavia
roadside, common

4 84

climbing on fence around garden

4 85

tree growing in doorway

? 86

~~Chrysanthemum~~
common tree in fence rows
and vacant lots

4 87

cultivated in garden

88 *Eryngium foetidum*
spontaneous in garden

1

tree 5 m. tall; flowers
yellowish, turning reddish,
fruit oblique with greatly
enlarged fleshy pedicel.
prostrate, spreading
from deep wing root,
flower white.

ascending from
prostrate base
herbaceous vine, flowers
whitish.

tree 5 m. tall, flowers
greenish.

tree 8 m. tall, ripe fruit
black with red receptacle.

shrub, m. tall, ~~so~~ with
straggly branches; flowers
bright yellow, petals thin.
herbaceous with a strong
unpleasant odor. "celintio"
used to flavor food.

April 29 - trip by road from David to Panama City.

From David to somewhat ~~east~~^{south} of the eastern boundary of Chiriquí Province the vegetation is largely a second-growth or cleared wet forest, with *Cecropia*, etc. In the region of the Boquete Lantiago are extensive mangrove swamps. As the road passes over the range of hills just west of Boquete, the vegetation changes to a scrubby savanna, with legumes, *Brysonima crassifolia*, etc. There are even large stretches of grassland.

Just northeast of Boquete passing over another range of hills, the road again enters a rainy region of wet forest.

May 3 - packed for shipment, in phgs. 2-7 all plants up to #27388. phgs. 2-6 sent with green & orange tags to USDA Hoboken, for forwarding to Chicago Mus. #7 sent directly to Chicago. Colls. #27389-27394 to be dried by Paul Allen and sent as phg. #8 to Chicago.

May 5 - flew from Panama to Medellin - Pacific coast of Panamá is a typical sinking coast - dominated by estuaries. Few settlements, solid forest until obscured by clouds in interior. Country low, but with long north & south (?) ridges. *Cavanillesia* (?) very abundant everywhere except on some of the ridges and in the mangrove swamps.

104

1947 - Panama

half way between

April 30 - Gamboa and summit, C. Z. 79°40' W

27389 *Emilia sonchifolia* 9°5' N.

2 seaweed in crack in sidewalk 75 m.

May 4 - same

90 seaweed along roadside, common

May 4 - Chiva Chiva Road,
4 mi. S. N. of summit, C. Z.decadent forest, ~~so~~ rather
dry, with ~~so~~ sparse
undergrowth.91 ~~Masiovenum~~ ~~cruciferum~~ side of ravine
shrub, ~~sparsely~~, ~~so~~92 *Masiovennum glabrescens* (Benth.) Wedd.
(Benth.) Wedd.
wooded slope

May 4 - Madden Rd. 3 mi.

~~so~~ of summit, C. Z.second growth thickets
along roadside93 *Colubrina heteroneura* (Grisb.) Standl.94 *Goodmania aesculifolia* (HBK.) Standl.

↑

(- Paul H. Allen # 4492)

Canal zone

105

flowers purple.

9°5' N.

75 m.

spikes erect, flowers
minute, purple.

79°35' W

9°5' N.

75 m.

shrub, sparsely branched
catkins pendent.
small tree, 3 m. tall,
1.5 dm. thick.

79°38' W

9°4' N.

75 m.

shrub 4 m. tall, leaves
very young.spreading tree 3 m. tall,
flowers yellowed, with fine
purple punctations within on
all except the upper part of corolla.

106

1947 Colombia

+ May 7 - Cartago
roadsides27395 *Cordia*5 96 *Revina*5 97 *Conyza bonariensis* f. *subliotheca* Cuatr.
det. J. Cuatrecasas+ 98 *Cochliasanthus*5 99 *Trifoliate*?

cultivated in yard of dwelling

27400 *Paspalum*principal grass in lawn
of playa.4 01 *Stachytarpheta cayennensis* (L.C. Rich) Vahl.
roadsides det. Maderake

(San Antonio)

✓ May 9 - just below Saladito, on
Carretera del Mar, headwaters
of Rio Cali, 10 km. w.w. of Cali

1700 m.

brushy ravine on cleared slopes

19 02 occasional in brushy places
from here down to 1500 m.

El Valle

107

shrub 1 m. tall, flowers whitish,
fruit red when ripe.herb, flowers white, fruit red.
depressed, much branched
herb, branches erect; rays
dull white, disk yellow.branched herb, branches
tending to be distichous,
flowers yellow.tree 4 m. tall, petals yellow.
fruit immature.flowering culms ascending
from prostrate superficial
rhizome.branched herb, flowers
pale lavender.

3° 27' N

76° 35' W

tree 10 m. tall; leaves thick,
glossy, ^{variegated outside,} flower ^{cream}
white _{inside}, turning dull tan,
with a fragrance like
very strong perfume, calyx
dehiscent even before anthesis; fruit inodorous

108

1907 Colombia

27403 *galium hypocrateum* Benth.
in brush

✓ May 9 - Above Camer.

2-
6600'3°33' N
76°37' W

Cleared hills

" 04 *Cinchona pubescens* Vall. var.
very common in fence rows
and persisting in cleared
pastures" 05 *Cinchona (Ladenbergia) cuatrecasii*
occasional in fence-rows✓ May 9 - La Elsa, Quebrada
la Cristalina

850-900 m.

3°38' N
76°47' Wthick tangled wet woods,
partly cleared." 06 *Sabicea*
edge of woods" 07 *Palicourea*
edge of woods

El Valle

109

vine-like fruit orange.

small tree 4 m. tall.
leaves dull, old ones turning
red; fruit not ripe, but
ones attached by insects
dehiscing.rounded tree 7 m. tall,
fruit dry.vine climbing in brush,
flowers pink.
shrub 3 m. tall. thyrses
red-purple, turning greenish
purple, flowers purple,
fruit immature

110 1947 Colombia

27408 *Trichomanes elegans*
deep wet forest

10. 09 *Joosia*
common in deep wet forest
edge of grassy pasture

4. 10 *Borreria*
common

3. 11 *Drymaria cordata*
common

10. 12 common in fence-row

5. 13 *Peperomia*
epiphytic on tree trunk in
fence row.

2. 14 *Arvid*
epiphytic on trunk of tree
in fence-row.

f. R. t.
g. created same May 11
thick wet woods on top and
sides of ridge 1100 m.

15 *Peperomia*
climbing on tree trunk

16 *Geosiris*
rare, climbing in bushes

17 *Burmeistera*
epiphytic, rare

111 El Valle

ponds of a peculiar
bluish green color.

small slender tree
5 m. tall, bark very bitter,
fruit mostly immature

~~tree~~ flowers white.

flowers white.

small tree 5 m. tall,
flowers purple, ripe fruit
black.

not especially fleshy,
stems round below,
square above.

semi-scendent; spathe
green, reflexed; fruit soft,
lavender, translucent.

somewhat fleshy,
clinging to
vine, flower red.

shrub, flowers green

112

1947 colombia

27418 asplenium

in deep shade, terrestrial

19

parasitic on roots, steep slope

20

Hoffmannia

in open bottom of valley

(2700')

330 m.

21

common on top of ridge

22

Vaccinium

local on steep slopes

23

rare, epiphytic

24

Weinmannia

Cl Valle

113

rhizome short, erect.

plants rose pink, head spherical, tessellate, plates with an umbo more or less conic, and striate, plates caducous in age, leaving soft pink hair-like processes which later fall off, leaving firm central core showing somewhat tessellate markings.

small sparsely branched tree, branches leafy near apex, cymes vermillion, corolla vermillion with yellow lobes; fruit immature. leaves dark green above, pale beneath; flowers white. scrambling vine-like shrubs, inflorescence down to base, these vermillion corolla green with pale to white tips. flowers purplish

tree 7 m. tall, this branch young, sterile.

27425 *Ladenbergia*
 26 *Elgagia*
 very common on and near
 top of ridge all in flower,
 less common below
 27 *Cinchona* (Ladenbergia)
 common, especially on
 top of ridge
 28 *Psychotria*
 top of ridge
 29 *Peperomia*
 epiphytic on tree trunks
 on top of ridge
 30 *Miconia ternatifolia* Triana (det. Wurdack
(1968))
 top of ridge
 31 *Besleria*
 top of ridge
 32 *Blakea podagraria* Triana (det. Wurdack (1968))
Proboscidea
 top of ridge, uncommon
 33 ~~*Polygalotricha*~~ *Palicourea*
 common in undergrowth
 34 *Palicourea*
 rare on ridge top

seedling 1 m. tall.
 tree 15 m. tall; flowers
 white. peculiarly fragrant.
 tree 5 m. tall. 7 cm. thick;
 others much larger
 fruit immature but
 probably full sized.
 ascending to erect in
 sym.
 unbranched shrub
 1 m. tall, ripe fruit
 orange
 somewhat fleshy
 shrub 3 m. tall,
 fruit white.
 shrub with weak
 branches, flowers orange,
 succulent, fruit spherical
 shrub 3 m. tall; fruit
 rose pink
 shrub 1.5 m. tall,
 flowers whitish, fruit immature
 green with pale lines.
 shrub 4 m. tall, immature
 fruit bluish green, with
 pale lines, glossy.

27435 *Burmeistera*
ridge top
36 steep slope

37 on steep slope

38 *Dioscorea*
on steep slope

39 *Manisla*
on steep slope

40 *Psychotria*
on steep slope

41 *Clusia*
epiphytic on very large tree

May 13 flight from Cali to
Ipiales.
In soutⁿ. part of Cauca
Valley are dense patches
of Guadua.
East of Río Cauca from
Santander south, and
south of it to divide south
of Popayán the country
is a rolling, dissected
plateau, mostly in
pasture, with thin
patches of woods here and there.

watercolor
mailed
colombia
collection
to F.M.
1947

flower green

small tree, ~~floral~~ lachiferous,
flowers pale green, fruit
green

small tree, lachiferous,
buds on leaf-bud curved,
slender vines.

vines, flowers white.

unbranched shrub,
flowers whitish.

♀ shrub, leaves leathery,
fruit immature.

May 13 the divide,
south of Popayán, to
about La Union, the country
is made up of rugged
absolutely treeless hills
with thin grass and
very few inhabitants.

How such absolute denudation
could have been accomplished
by so few people is astonishing.
Perhaps a fundamental sterility
of the soil may have helped,
as H.A. Arroyo suggested.

May 14 - El Voladero, Páramo
del Angel, 10 km. n.e. of El Angel,
Prov. de Carchi

open páramo 3650-3700 m.
dominated by *Espelletia*

0°40' N

77°51' W

27442

one of the dominant grasses

43 *Diplastrium glandulosum* Hieron. det. J. C. Cu
common

44 *Hedysotis*
common

45 *Espelletia hartwegii* Benth.
abundant, the dominant shrub
(photo on roll 7)

46 May 14 - Hacienda Charalán,
just above El Angel, PRO. Carchi
weedy ditch banks and
road cuts 3700 m

46 *Festuca*
common weed

47 *Papaver*
common on cut banks

1. *Cuernos*. ramele purple

Or	Oc	Occurrence	Lat.
D ₁	D ₂	Date	
C ₁	C ₂	Coll. F.R. Fosberg	1947 Alt.
R ₁	R ₂	Remarks	No.

1947 Cinchona Expedition

m. (estimated)

3800
3500
15200
1170

3800
3500
15200
1170

lactiferous, latex white,
buds nodding, petals mauve
with deep maroon spot at
base. "dormidera"

Veins 8-10-12-(16)

lvs. obovate to
lance-ovovate,
rarely broadly
lanceolate or elliptic
chartaceous
usually cuneate-attenuate
at base, rounded
or obtuse at apex,
rarely a tree with
pointed lvs.

~~Domatia~~ usually
present but
variable in dist.
occurring at all
or part of axils and
all or part of main forks,

if levigated, then
usually more toward
apical end of leaf.

stipules oblong to
ovate or ~~long~~
ovate-lanceolate
not strongly carinate
or acute.

branches firm,
with usually
small

leaf surface
dull, rarely
subglossy

$$\begin{array}{r} 3800 \\ \hline 15200 \\ \hline 13112 \end{array}$$

PLANTS OF PERU

Dept. de Cajamarca

Det.

Locality

Prov. de Celendin
° ' W.

Lat. ° ' S., Long. ° '

Occurrence

Date , 1947 Alt.
Coll. F.R. Fosberg No.

Remarks

m. (estimated)

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

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Locality

Prov. de Celendin

Lat. ° ' S., Long. ° '

Occurrence

Date , 1947 Alt.
Coll. F.R. Fosberg No.
Remarks

m. (estimated)

1947 Cinchona Expedition

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Locality

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Lat. ° ' S., Long. ° '

Occurrence

Date , 1947 Alt.
Coll. F.R. Fosberg No.

Remarks

m. (estimated)

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Det.

Locality

drainage of Rio Limon

above Cortagana (Chimuch)

30-32 km. n.n.w. of CELENDIN, Prov. de Celendin

Lat. 6°33'S., Long. 78°17-18' W.

Occurrence

dense wet forest

Date July 2, 1947 Alt. 2300-2500m. (estimated)
Coll. F.R. Fosberg No.

Remarks

1947 Cinchona Expedition

PLANTS OF PERU

Dept. de Cajamarca

Det.

Locality

Prov. de Celendin
° ' W.

Lat. ° ' S., Long. ° '

Occurrence

Date , 1947 Alt.
Coll. F.R. Fosberg No.

Remarks

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Remarks

1947 Cinchona Expedition

May 14 - El Voladero, Páramo
del Angel, 10 km. n.e. of El Angel,
Prov. de Carchi

open páramo 3650-3700 m.
dominated by *Espelletia*

3-7442

one of the dominant grasses

43 *Diplodstephium glandulosum* Hieron. det. J. Cuatrecasas common

44 *Hedyotis*
common

45 *Espelletia hartwegii* Benth.
abundant, the dominant shrub
(photo on roll 7)

46

May 14 - Hacienda Chavallan,
just above El Angel, PRO. Carchi
weedy ditch banks and
road cuts 3730 m

46 *Festuca*

common weed

47 *Papaver*

common on cut banks

0°40' N

77°51' W

clumps, panicle purple

shrub less than 1 m. tall,
flowers lavender-pink.
forming mats and
cushions, flowers white
within, purple without.
leaves glistening, fleshy,
paler, beneath. (note ~~are~~ apiculate
apex to leaves and pointed calyx lobes)
trunks 2 m. tall, leaves
in a single large rosette
at top, inflorescence
ascenning, flowers yellow.

47' N

77°57' W.

lactiferous, latex white,
buds nodding, petals mauve
with deep maroon spot at
base. "dormidera"

120

1947 Ecuador

27448

Calceolaria

5

common

3 49

Gedda hololeuca

occasional

1

11

50

Spergula

common

May 14 - Drive from
Tulcan to Quito.

not far south of
El Angel, at middle
altitudes, *Hedysarum thyrsifolium* (?)
dominates certain over
grazed slopes. This
same vegetation is
found at various
places between here
and Quito.

At Ibarra in the plaza
is a tremendous old
balsa tree - Ashdowna.
at 7500' alt.

121

Carthi

herb up to 0.8 m. tall

flowers sulfur-yellow

branching, semi-prostrate
herb; flowers dull purple
with whitish margins
and sinuses; fruits green.
"yerba mora"

semi-decumbent herb
with somewhat fleshy leaves.

May 19 - Valley of Rio Papallacta north of Volcan Antisana
~~starts~~ starts at the pass de Guanani, at about 4000 m. In this pass there is open grassland with many paramo plants - a real flower-garden where not grazed by goats. Here and there are patches of low woods almost all of Gynoxys trees.

Going downward one finds subparamo-like brush, largely melastomes, etc. gradually changing to woods. From the village of Papallacta down the country is wooded. Just above Papallacta a lava flow, relatively recent, has dammed up the valley and caused Laguna de Papallacta, a sizeable body of water. The lava flow has a thin vegetation with a Blechnum (Comaria) very prominent.

Below Papallacta the forest becomes tall very wet. In the valley bottom Aldrovia is dominant down to 3000 m. or below. The sides have a mixed forest, with some melastomes, Brunellia, etc. but with a conspicuous scarcity of Rubiaceae. No cinchoneae seen.

About half way to Cuyuja the Rio Papallacta is joined by the Rio Chalpi (and becomes the Rio Guijos. There is some local dispute as to where the name R. Guijos is correctly applied.) The Rio Chalpi is larger than the R. Papallacta and enters from the north.

Cuyuja is said to be about half way bet. Papallacta and Baesa, and said to be about 2800 m. alt. It is a tiny village.

124

1947 Ecuador

v 100 May 19 - Cuyuja, valley of
Rio ~~Quijos~~, Papallacta.

25°S
78°1'W

2800 fm. a.

muddy trail side with running
water.

27451

Pyrolaria
common in mud

5

Polygonum
occasional

5

Cardamine
common

5

Polygonum
common

5

Veronica
occasional

5

Pastinum
occasional

5

Mimulus
occasional

6

Callitrichis
abundant in water, emerging.

Napo - Pastaza

125

recumbent, supported by
other vegetation.

ascending from decumbent
base; flowers rose-pink.
erect, flowers white.

ascending from decumbent
base, flowers white to dull
pinkish. Not eaten by cattle
because of its pungent taste,
but occasionally by mules
ascending to erect; corolla
caducous in evening,
white.

erect; flowers small,
white.

an epiphytic plant succulent,
ascending from prostrate
base; corolla yellow, with
palate and lower sides
of throat dotted with red;
throat translucent beneath.

plant strong enough
to support self.

126

1947 Ecuador

27459 *Eleocharis*

common in mud

2 60 *Epilobium*

1 rare at edges of mud

May 20 - Valley of Rio Papallacta
1-5 km. below Cuyuja

2600-2800 m.

cleared slopes and benches
with thickets and wooded
ravines61 *Sauvagesia bullata* Wawracommon, persisting after
clearing62 *Cordia*

occasional

63 *Solanum*
occasional64 *Solanum*
common65 *Gnaphalium*
occasional66 *Stellaria*
common

67 common

127

Napo-Pastaza

forming cushions.

erect from prostrate base;
flowers white.

26°S

78°W

small tree, others up to
10 m. tall or more; flowers
white, fruit eaten.small tree, others up to
10 m. tall; fls. whitish; bast
fiber used for rope-making.herb 1.5 m. tall; flowers
purplish green; leaves
very rugose; fruit immature.herb 1 m. tall, flowers
white.

heads rusty

flowers white

flowers yellow; said to be
an effective remedy for
toothache, much eaten by
cattle.

128

1947 - Ecuador

27468 *Dynmaria ovata*

common

69 *Carica*
common70 *Pynoglossum*
occasional~~71~~ ~~Carica~~71 *Carica*
common72 *Banchedia parviflora* Spruce det. J. Cuatrecasas
common both in open and
in thickets

129

Napo-Pastaza

gray-green, procumbent,
flowers whitetree up to 5 m. tall, simple
or branched candelabra
fashion, ♂ flowers green
almost sessile; fruits
below leaves, orange-yellow
when ripe, 5 ridged, pulp
around seeds edible, tart,
flesh watery, said to be
used for preserves, juice
makes lips sore.
(seed sample) (with #27471)

flowers blue

tree up to 5 m. tall, simple
or branched candelabra-fasion,
♂ flowers green, paniculate,
leaves usually larger than
in this specimen. (with #27469)tree 5 m. tall, others much
taller, trunk covered with
clusters of spines, branches
becoming less spiny,
ultimate flowering ones
spineless; flowers rose-
purple.

130

1947 Ecuador

broken-down forest filled with
chusquea

27473 *Hoffmannia*

uncommon in ravines
and on steep slopes

2 74 *Begonia urticae* L.f. det. L.B. Smith
rare5 75 *Toussia*
common in open places under
trees

5 76 common in open places under trees

1 77 rare in open places under trees

3 78 *Cyperomia*
occasional on fallen tree trunks1 79 *Malaxis*
rare, terrestrial2 80 *Sanicula*
occasional in open spaces
under trees81 *Hedysarum*
occasional1 82 *Pilea*
common in open places under
trees.

Napo-Pastaza

131

sparsely branched shrub
2 m. tall; flowers yellow;
fruit immature.

herb up to 1 m. tall, stem
fleshy; flowers pink.
stem fleshy.

stems fleshy, reddish; leaves
green, without white markings
(with #27477)

stems fleshy, reddish; leaves
with hairs above with condic-
uous white prickle base
(with #27476)

more or less fleshy; used
to coagulate milk in cheese
making.

flowers greenish

small tree, fragrant
when broken; "granize"
by more or less in one plane;
mostly sterile.

132

1947 Ecuador

27482

epiphytic on tree trunks

deep reddish vine, massive
bushy tree

7 84

common everywhere

5

85 Vaccinium

local, just above river

3

86 Spigelia

local on bank above river

1

87 Phytolacca

rare on bank above river

7

88 Tovaria

common on banks above river

4

89 Cestrum

rare, just above river.

12

90

rare, just above river

Napo-Pastaza

133

flowers dull reddish-orange

forming tangled masses,
clambering in trees, stems
solid, up to 2.5 cm. thick;
only one plant seen in flower,
fertile & sterile of specimen
gathered not necessarily from same plant.vine like, climbing in
brush, leaves arranged
distichously; corollas
white.herb 1 m. tall, sparsely
branched, flowers deep
crimson-purple.stems maroon, flowers
deep rose-pink; ~~no~~ fruit
said to be used to wash
clothes. "atuxara"shrub 2 m. tall; flowers
pale green, fruits green.shrub 2 m. tall, flowers
deep purple, petals green within;
fruit black.vine, tangled in bushes;
fruit immature.

27491

*Pilea*common in opening under
trees92 *Spicidium*

rare, in gallantree

cut banks and second-growth
thickets along trail.93 *Polyodium*

pendent from overgrown bark

94 *Galium*~~earth banks~~ old tree trunks95 *Hellaria*

earth banks

96 ~~Liabum~~ *Liabum*

thicket

97 *Tournefortia*

common in thickets

98

common in woods and thickets

99 *Centropogon*

common in thickets

stems glabrous, flowers
whitish green.flowers crimson-magenta,
columns whitish.rhizome creeping, ponds
stiff. "calaguana" used
to purify the blood."prostrate, tangled,
climbing.vine-like, tangled,
flowers white, petals
bifid.scrambling herb, branched,
several m. long, definitely
lactiferous, flowers yellow.
shrub 2 m. tall, leaves
very rugose, flowers
purplish white.scrambling vine-like
shrub, flowers pendulous,
dark orange, paler at mouth,
said to contain sweet fluid
that is eaten.scrambling shrub
twigs red with yellow lobes,
column white, anthers dark gray.

27500 *Passiflora*
thickets

5 01 *Fuchsia scabriuscula* Benth.
thickets, common
Tee. A.C. P.M. 1978

1 02 *Poinsettia tuberosa*
rare on bank

5 03 occasional, climbing in
small trees

1 04 *Oenothera*
rare on trampled ~~to~~ grassy bank

2 05 *Porteria*
occasional

8 06 *Borreria laevigata*
rare along trail

5 07 *Calceolaria*
common in thickets, (also
in pastures)

↑

✓ 08 May 21 - Cuyuja, valley of
Río Papallacta.

along trail

08 *Salvia*
common

2800 m. (8)

25° S
78° 15' W

wine-like, flowers
bright magenta-purple,
3-parted, petals equal,
broadly elliptic, acute.

scrambling shrub;
leaves zigzag; flowers
crimson

flowers deep purple
with yellow anthers.

wine-like, branched

petals red, yellow at
tips. - indigenous
small tree, becoming
much larger, flowers
pale green. "Liquia" fruitation.
flowers white

scrambling herb.
flowers yellow.

shrub 2 m. tall, flowers
crimson.

bottom of ravine along
river

27509 *Blechnum*
occasional
4 10 *Blechnum*
common

6 11 *Piper*
occasional
6 12 *Palicourea*
occasional

pastures with thickets, not
far from river.

1 13 *Nertera granadensis* (L.f.) Drue
not ^{open} place among thickets,
rare.
5 14 *Phyllanthus*
occasional

5 15
common

rhizome short, erect, fertile
fronds erect, sterile spreading.
rhizome erect, up to 3 dm.,
fertile fronds erect, sterile
spreading, tips prostrate
on ground, ~~the~~ ^{several} mud,
elongate, young fronds
reddish.

shrub 1.5 m. tall.

shrub 4 m. tall; flowers
rose-purple, fruit immature.

prostrate; leaves crisped;
flowers pale green; fruits
deep red, translucent.

small tree 4 m. tall, with
single erect stem and
horizontal, deciduous
branchlets which simulate
compound leaves; flowers
pendent, reddish bronze.
small tree; fruit fleshy,
immature. "motilon" fruit
purple, edible when ripe.

140 1947 Ecuador

27516 *Tournefortia*

rare

6 17 *Tournefortia*
occasional

3 18 rare, epiphytic on trees in thicket

6 19 *Galium hypoleucum* Benth.
rare, climbing in trees in thicket

6 10 *Piper*
occasional

steep very weedy corn-patch
in clearing in wet forest
on wall of valley.

2900 m.
~3000 m.

5 21 common

6 22 *Solanum*
rare

4 23 *Oxalis*
common weed

5 24 *Stellaria*
common weed

Maps-Pastaza

141

shrub 4 m. tall, bushy;
flowers white, becoming
rusty.

small spreading tree;
flowers white, becoming
rusty, unpleasantly fragrant.
shrub; flowers white,
panicles very fragrant.

vine several m. long,
tangled; petioles flowers
greenish; fruit orange,
flavor unusually large,
erect shrub 2 m. tall;
leaves harsh; spikes red.

spreading scandent
herb; flowers and
bracts white.

trailing herb, stems
elongate, no tubers found;
flowers white; fruit green,
ovoid.

extensively creeping;
flowers yellow.

prostrate, tangled;
petals white, rigid.

142 1947 Ecuador

27525 *bagina*
3 occasional
6 *W. bracteatum*
common in open ravine
5 27 *Galium*
occasional
28 *Solanum nigrum*
occasional
5 29 *Drymaria covata*
common
6 30
common

On south side of valley,
dense montane rain-forest
on steep slope, undergrowth
largely *Clusquia*. 2900-3000 m.

31 *Asplenium*
common, epiphytic and terrestrial
32 rare
33
epiphytic on liana, we saw
34 climbing in trees
35 rare

Napo - Pastaza

143

prostrate, tangled;
petals white, entire.
roots yellow, flowers
yellow.
prostrate, roots yellow;
flowers reddish green.
weak herb, slender;
flowers white.
elongate prostrate herb,
petals white, bifid,
shorter than sepals.
flowers deep orange-red.

rhizome erect, to several
dm. long.
shrub up to 2 m. tall, weak;
calyx & pedicel red, corolla
yellow.
flowers white.

tangled liana

small shrub, leaves
pale beneath; calyx red,
corolla yellowish with
red outside, ^{but} ~~below~~, ~~lower~~ half red.

144 1947 Ecuador

27536 *Hoffmannia*
occasional

4 37 *Hedyosmum*
occasional on ^{steep} ridge

10 38 epiphytic in tree on ^{steep} ridge

1 39 *Asplenium*
occasional, terrestrial

5 40 *Peperomia*
common, terrestrial

2 41 *Peperomia*
occasional, epiphytic
on branch of tree

3 42 *Mikania*
common, some

This whole valley, from Papallacta to at least 5 km. below Cuyuja is cut in beds of gneiss and schist. The gneiss are relatively dense and wet, and would seem to be ideal for Rubiaceae, but this family is almost absent. Altogether we saw one Guettarda (sterile, not collected), which is occasional, a single Palicourea which

Nobs - Pastaza

145

shrub up to 2 m. tall;
flowers yellow, ripe fruit red.

shrub 3 m. tall, &
aromatic. "granizo".
liana-like shrub.

dark green

fleshy, rhizome
creeping, to several dm. long.
leaves pale beneath.

fleshy

liana, usually sterile.

was seen a few places near the river, two Galiums which are occasional, *Boronia laevigata* one plant seen, *Nertera granadensis*, 2 small colonies seen. The latter 2 are weedy in most place.

Weinmannia is seen occasionally but not common, several species. *Melastomaceae* common.

146 1947 - Ecuador

✓ May 22 - Valley of
Rio Papallacta at
confluence of Rio Chalca
5 km. below Papallacta
Dry season
bare rocky trail across
river bed.

44 *Thalictrum*
very common along trail
in edges of thickets

✓ May 22 - Valley of Rio
Papallacta 5 km. below
Papallacta 49 km. e.s.e. of Quito
sides of ravine cut by
small stream

45 *Calceolaria*
wet earth banks

✓ 46 *Geranium* (?)
common in dense weedy
growth along trail

✓ 47 *Tropaeolum*
in dense weedy growth
along trail

✓ 48 *Solanum nigrum*
abundant in ravine along stream.

✓ May 22 - Valley of Rio Papallacta
1 km. below Papallacta

45 km e.s.e. Quito

thickets of second growth along trail

Napo - Pastaza

147

50 km. e.s.e. Quito

flowers white

herb 1-2 m tall, to monocious
calyx glaucous purple,
stamens maroon

23°S
78°W
2450 m. a.s.l.

flowers yellow

wine-like, flowers
lavender-pink.

great succulent-stemmed
herb 1-2 m. tall; flowers

3100 m. a.s.l.

148 1947 Ecuador

27549

common climbing in trees

50 *Centropogon*
rare

May 22 - Papallacta,
valley of Rio Papallacta

44 mm. e.s.e. quite
cleared pasture-land
with brushy ravines
and fence-rows, gentle slopes.

51

in fence-row

52

in fence row (with #27554)

53 *Equisetum*

on vertical earth bank,
common

54

common along fence-rows
(with #27552)

55

Miconia crocea (Desr.) Naud var. *setosa* Maff.
(det. Wurdack (1968))

common in fence-rows

56

Barnadesia arborea HBK det. J. Cuatrecasas
dominant fence-row shrub

Napo - Pastaza

149

wine, flowers greenish.

scrambling shrub; curly
orange-red with greenish-
yellow lobes; the only
other plant seen in the
vicinity had the same
elongate calyx lobes.

27550

78° 8' W

3400 m.

wine-like herb; flowers
greenish-white; fruit immature.
herb 1 m. tall; flowers
salmon-red.

herbs 1-1.5 m. tall; flowers
white with deep red center.

shrub 1-3 m. tall; flowers
white; fruit purple.
shrub 2-3 m. tall very
spiny throughout; flowers
rose-pink.

150 1947 - Ecuador

27557 *Lithocarpylus*
common in fence-rows

1

May 23 - Laguna Papallacta,
above Papallacta.

lava flow which blocks
valley to form lake; broken
lava blocks covered with a
blanket of mosses and
hepatics, with ferns,
orchids, dwarf shrubs,
a few larger shrubs, but
with no trees.

27558 *Blechnum*
dominant on steep slopes
at front of flow.

2 59 *Azorella*
scars on steep slopes

2 60 common, especially on
steep slopes, rhizome deep in cracks between
rocks.

Napo - Pastaza

151

shrub 2 m. tall,
lactiferous; flowers
with corolla pale
green with bronze streak
outside on each lobe,
calyx bronze-purple;
f. mature fruiting
pedicels deflexed.

23°
78°9'W
3500 m.
On this lava flow,
surrounded by wet
forest, festooned with
moss, the vegetation
is essentially that of
the ~~deciduous~~ timber-line
region several hundred
m. above. The steep
slopes are dominated by
Blechnum aff. *arborescens*, but
this does not occur on the broken
but relatively level top of
the flow.

stem erect, up to 4 dm. tall,
stele ^{strongly}
~~all~~ ^{strongly} ~~fronds~~ ascending,
fertile ones erect.
mat-forming

152 1947 Ecuador

27561

2 rare on steep slopes, always
in cracks between rocks.

3 64 *Gaultheria*

rare

4 63 *Hieracium*

common (mostly with heads
abortion)

5 64

rare on steep slope

5 65 *Pernettya*

local

5 66 *Lycopodium*

rare, usually under
somewhat overhanging
rocks, growing out of crevices

2 67 *Lycopodium*

rare on steep slope

6 68 *Diplostephium spinulosum* Wedd.
det. J. Cuatrecasas

rare

2 69 *Vaccinium*

common, mostly sterile

4 70 *Hymenophyllum*

rare on overhanging rock

2 71 *Pernettya*

occasional

72 *Miconia*

common

73 *Vaccinium*

rare

maps - Pastaza

ponds erect.

small shrub, fruit black

flowers yellow.

shrub up to 0.7 m. tall;
flowers white.

in clumps.

creeping.

bush 1 m. tall, rays white

shrub 1.5 m. tall, flowers
pink.

dwarf shrub, fruit pink.

strictly erect shrub 2 m.
tall; all sterile.

dwarf shrub; flowers
coral pink; fruit white.

153

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27574 *Myrsine*
occasional

75 *Baeckea* *genistelloides* (Lam.) Pers.
det. J. Cuatrecasas
common

76 *Gaultheria procumbens*
rare

77 *Peperomia*
uncommon

78 rare, terrestrial

79 *Diplastelium hartwegii* Hieron.
det. J. Cuatrecasas
occasional

80 *Vaccinium*
common

81 common, terrestrial

82 *Elaphoglossum*
common

83 *Berberis*
rare

84 *Elaphoglossum*
rare

Napo-Pastaza

155

branching shrub, m.
tall; ripe fruit black.
mostly sterile; heads
whitish.

wine, climbing in low bushes;
fruits fleshy, orange.
(epiphytic on moss-covered
bushes,) erect, fleshy.
erect, 1 m. tall, branched
at base and at top, flowers
waxy, white, outer segments
with maroon flecks outside,
odor musty, not very pleasant.

shrub, m. tall; rays
deep lavender

small shrub, fruit white,
translucent when ripe.

flowers deep rose (mostly
not in flower).

fronds erect, stiff.

shrub 2-3 m. tall, very
gnarled and ragged, some
branchlets with leaves spines;
leaves white beneath;
flowers orange-yellow
flushed with red.

fronds erect, very brittle.

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27585 *Elaphoglossum*
occasional on rocks

5 86 *Pernettya*
common

5 87 *Hesperomeles*
common " "

2 88 *Muehlenbeckia*
occasional on flat rocks

5 89 *Polyodium*
common, terrestrial

2 90 *Hymenophyllum*
rare, under overhanging rocks

5 91 *Polyodium*
common

1 92 *Baccharis*
rare

2 93 *Pernettya*
common (prob. same as 27586)

5 94 common in deep moss

5 95 *Erythroxylum*
common on rocks

Napo-Pastaza

157

shrub, leaves stiff, pale
beneath, veins pellucid;
berries white.

depressed spring shrub;
- fruit immature

forming cushions;
- fruit black, fleshy when ripe.

rhizome creeping, glaucous.

ponds erect

shrub 0.7 m. tall; involucres
purple, flowers white

small shrub; fruit
flushed with red.

erect, flowers white

flowers white.

158

1947 Ecuador

May 23 - Eastern slope of
Paso de Guamani, headwaters
of Rio Papallacta
37 km. e. s.e. quito

3800 m.

23° 3'
78° 10' W

✓ 5 open mountain meadows
and walls of ravine

27596 *Bartsia*

common

✓ 97 *Jameania*
occasional on vertical banks✓ 98 *Bartsia*

common

✓ 99 *Epilobium*
common along trail✓ 27600 *Plantago*
occasional✓ 01 *Valeriana*
occasional on vertical banks✓ 02 *Ranunculus*
rare✓ 03 *Nertera granadensis*
occasional on vertical banks

✓ 04 rare

same & extensive margin
dominated by

✓ 05 ~~07~~ *Senecio pinnatifolius* HBK det. J. Cuatrecasas
on vertical banks, occasional

Napo-Pastaza
Pichincha

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bracts purplish; corolla
bright purple
stands very erect.

bracts edged with purple;
corolla pale green.
tips nodding; flowers
rose-purple.

slender small shrub;
flowers purplish white.
calyx deep bronze, corolla
yellow.
prostrate, flowers pale
green, fruit red, rare.

leaves fleshy, & rays bright
buter-yellow.

✓ same - large marsh,
dominated by # 27611

27606 *Lycopodium*
common

✓ 07 *Alchemilla*
occasional

✓ 08 *Carex*
abundant

✓ 09 *Hypericum*
common

✓ 10 *Genesia chionogeton* Wedd. det. J. Cuatrecasas
rare, in marsh and above
✓ 11
abundant, dominant

May 23 - Passo de Guamani,
just ~~east~~ of summit

4000 m

small patch of forest,
mostly *Gymnosys* + *

✓ 12 *Lycopodium*
epiphytic on tree trunks

✓ 13 *Elaphoglossum*
epiphytic on tree trunks

✓ 14 *Gymnosys baccharoides* (HBK) Cass. det. J. Cuatrecasas
codominant tree in forest

✓ 15 codominant tree in forest

3900 m.

strictly erect, in clumps,
bronze-red.

caespitose, heads
nodding.
small shrub; flowers yellow.
heads greenish yellow
shrub up to 1 m. tall; branches
and leaves in one plane.

23° S
73° 10' W

large mass, pendent;
leaves slightly pungent.

tree 3 dm. thick, 10 m. tall,
flowers yellow

tree 3 dm. thick, twisted,
10 m. tall, spikes pendent.

May 23 - Paso de Guamani
just west of summit,
headwaters of Quebrada de
Altosuchi, 35 km. e.s.e. Quito

4000 m.

✓ 27615 dense very wet forest, base of
tree trunks buried in
great mass of moss
and tangled branches,
trunks very mossy.

27616 *Hesperomeles*
common

✓ 17 *Baccharis arbustifolia* (Lam.) Vahl
occasional det. J. Cuatrecasas

✓ 18 epiphytic on mossy tree trunk
~~epiphytic on mossy tree trunk~~

✓ 19 - rare, epiphytic on mossy tree trunk
~~Gottschalkia hypoleuca~~

✓ 20 *Rubus*
epiphytic on mossy tree trunks

✓ 21 *Apium*
common, epiphytic and terrestrial

✓ 22 common, pendent from tree trunks

23° S
79° 15' W

tree 4 m. tall, flat-topped,
dark green, resembling
a juniper from a distance,
fruit reddish.

tree 5 m. tall, flat-topped,
dark green, resembling
a juniper from a distance.

flowers crimson

strong oily-celery odor.

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1947 Ecuador

21623 *Polypodium*
epiphytic on mossy tree trunk

24 *Hymenophyllum*
epiphytic on mossy tree trunk

25 *Guzmania*
epiphytic on mossy tree trunk

May 23 - Valley of Rio
Papallacta just below
Laguna de Papallacta

Prov. Napo - Pastaza

26 abundant everywhere, this
specimen from pebbly daystream bed

↑

Talking to several geologists, Walter Dauer, who has a geologic map of Ecuador, based on his own investigation and those of the oil companies and such other sources as available, Schwemle, chief geologist of Shell Co., and Franklin Wallis, mining engineer, I gather that the structure of eastern Ecuador consists

Pichincha - Napo - Pastaza 115

3450 - 4000

prostrate, forming
mats; flowers white

of a tremendous fault, running along the eastern base of the Cordillera, west of which has been pushed up a tremendous block running from somewhere in Colombia south through Ecuador, with a difference of many thousands of feet. This exposes, on the eastern slope, a great area of metamorphic rocks,

schists and gneisses.

To the east this is deeply buried under at least 9 or 10 thousand feet of sediments, running from at least Jurassic to Quaternary. The relationship is demonstrated by a remnant of the Cretaceous sediments persisting on top of the eastern cordillera.

In Cretaceous time the Atlantic and Pacific approached to within 50 km. of each other, but there was a strip of land corresponding more or less to the Andine valley and the eastern cordillera or part of it.

The absence of Cinchona from the higher altitudes in the Cordillera Oriental north of Baños and perhaps the absence of *C. macrocalyx* var. *pitayensis* from the eastern slopes of Colombia (Cord. Central) may perhaps be explained on the basis of the metamorphic nature

of these regions.

Wallis says these schists would weather to a very sterile soil, low in Ca + K. The actual volcanic slopes of Antisana and Tumaco have not been explored for Cinchona.

In southern Ecuador large areas are of Tertiary volcanic and intrusive material, but certain places, such as the Cordillera de Zamora, east of Loja, ~~C. m.~~ where *C. macrocalyx* is found, are metamorphic, as both Bauer and Wallis

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1947 Ecuador

* 30 May 30 - Quito
weeds in garden

27627 *Euphorbia peplus*
very common

30 28 *Cardamine*

29 *Veronica*

30 *Urtica urens*

31 *Galinoga*

32 *Cotula*
very common

* May 31 - Santa Rosa, on
railroad just south of
Quito, Prov. Pichincha
weedy railroad embankment

33 common

34 common

* May 31 - Machachi railroad
station, Prov. Pichincha 3200m.

* 35 *Calceolaria*
earthy banks

* May 31 - Chauspi (water tank),
south of Machachi, east of
Corazon Volcano, Prov. Pichincha
sparsely brushy mountain
meadow, sides of ravines

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Pichincha

13°S
78°30'W

petals minute, white.
recumbent, flowers blue-violet.
rays reddish-blue
spreading

16°S
78°30'W
3000m

large herb, flowers
yellow.
spikelets purplish,
nodding.

30°S
78°35'W

branched herb, sprawling;
flowers rich yellow.

32°S
78°35'W

3400m (see p. 172)

May 31 - Going south from Quito the nr. climbed up to perhaps 10,000' west of Corazon Volcano. There are great areas of grass - the stiff bunch grass of the region, and broken places with sub-paramo-like brush. McVaugh should compare the tall cream-colored *Siphocampylus* of the western range and valley with that of the eastern (#27557) as the one along the nr. is tomentose or at least whitish pubescent beneath and #27557 is not. (?)

Area north of Ambato is a rather barren volcanic ash, eroded in places. *Schinus molle* is a very prominent tree in bottom lands along river. *Caesalpinia spinosa* (?) common. Near Ambato fruit trees are planted in bottom lands.

Throughout region the land is cut up into small plots. These are separated by rows of *Agave* spp., *Opuntia* (*Cylindropuntia*) spp. or even *Puya* spp., and *Furcroya* spp.

There is an appearance everywhere of contour planting. This seems to be because the irrigation practice which utilizes furrows between the rows thus 

The main crops seem to be *Vicia faba*, potatoe, wheat and barley.

Little cultivation in the higher areas, 3000 m. and up. The valleys ^{of Satavanga} near Ambato, and especially Riobamba are very intensively cultivated.

On Chimborazo, grassy vegetation seems to go up clear to snow line, 15,000-16,000 ft.

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1947- Ecuador

27636 *Lupinus*

4 common

2 37 *Vicia*common in hummocks
of other vegetation.x May 31 - Dauli (flag stop)
on railroad, south east of
Corazon Volcano, Prov. Pichincha
earth banks along railroad,
in mountain meadow.2 38 *Eupatorium*
common39 *Alchemilla*
very common40 *Galium*
in clumps of other vegetationx May 31 - Lasso, north of
Latacunga, Prov. Leon2 41 *A.*
climbing in bushes along
railroad

Pichincha - Leon

173

shrub 0.5 m. tall; flowers
violet, banner with
a white wedge which
later turns red-purple.
flowers violet, banner
most strongly so.34°S
78°36'W
3300 m.dwarf-shrub; head white.
prostrate

prostrate, fruit pale green.

54°S
78°35'Wlacriforous vine; flowers
purple without,
yellow whitish within.

May 31 - Riobamba, Provincia
weedy ground around
city water works, on top
of low hill, grazed by goats.

27642 *Eragrostis*
common

43 *Nicotiana*
on top of mud wall

44 *Spartium junceum*
thickets, probably planted

45 *Verbena lacinata* (L.) Berg. det. modest
common in grassy places

46 *Lippia nodiflora*
common in grassy places

47 occasional

48 *Nasturtium officinale* R. Br.
common in trickle of overflow water

49 common

June 1 - From Riobamba
toward Guayaguil one
gradually climbs
through grain fields
to the altiplano south of
Chimborazo at ^{about} ~~a little~~
~~3500 m.~~ This is at about
the limit of cultivation

1° 40' S.
78° 38' W.

spreading tufts
spreading caespitose herb,
flowers pale green.

shrub 2-3 m. tall,
flowers bright yellow.

prostrate; flowers
lavender

prostrate; flowers pale
lavender, calyxes maroon.

tufts

prostrate, stems succulent;
flowers white.

tufts, culms erect or
ascending.

here, and one notices
grain growing in the
valleys surrounded
by grassy mountain
meadows. Just north
of Palmyra is a large
flat, probably an old
lake-bed, covered with

Virgin
of
the
not
evident.

loose volcanic ash of a dark blue-gray color. This is dominated, when there is any vegetation at all, by Senecio sp. with a scattering of a stiff bunch-grass. The bunch-grass becomes more dominant on the low knolls and slopes round about.

The Laguna de Colta is being drained more and more. The same close turf dominates most of the lake bed, but in places a dense growth of sedge may be seen.

Descending the Rio de Alausí and the Rio Chancha the grassland-vegetation gives way to sparse brush, cacti, Puya, Tillandsia, etc., with a small Fouquiera coming in lower down. On the gentler slopes this gives way to pastures, corn and grain fields.

Well below Sibambe the brush begins to get thicker and below Huigra really becomes forest, second growth, of course.

Below Naranjata the river levels out and soon emerges on the broad plain of the Rio Guayas.

Near the railroad there is no primary forest left. Open pasture and cultivated areas alternate with small patches of second-growth woods - la joly, leucopis and Erythrina glauca. The latter is also used as a tree to separate fields and is the common shade-tree for cacao, which is commonly grown here in the better drained areas.

As the Rio Guayas is approached

there are extensive areas of marsh, the less wet parts dominated by *Panicum maximum*, the wetter ones by a huge *Sagittaria* and a *Dolomiaea* or the sort of *Marantaceae*, both of these in flower at this season. Areas of water are filled by *Pistia* and *Salvinia*.

June 1 - Palmyra, Prov.

Chimborazo 3500 m. 2° 5' S
beds of loose volcanic ash, dominated by this species

27650 *benecis tretifolius* DC. det. J. Cuatrecasas
very abundant

June 1 - Tixán, Prov. Chimborazo
bottom of deep canyon

3 51 *Salvia*
common throughout region

June 1 - Libarbo, Prov.

Chimborazo high on sparsely bushy steep canyon walls.

In the broad estuary of the Rio Guayas are floating clumps of vegetation, mostly *Eichornia speciosa*?).

In the highlands are several *Salvia*s that would be good ornamentals - a deep blue, a red-maron with whitish calyces, and a large scarlet.

low bushes; leaves terete, with a resinous odor; flowers yellow.

2° 9' S
78° 42' W

3000 m. a.s.l.

subterranean herb, ascending; flowers deep brilliant blue.

2500 m. a.s.l.

2° 14' S
78° 42' W

27652 *Plantago*
 53 *Drymaria*
 54 *Muhlenbergia*
 55 *Polygalamontana* sp. nov. Cholat. det. W. W. Smith
 56 *Cragrostis*

flowers white
 flowers purplish, fruits
 green, bordered with
 bronze-pink.

June 1 Olimpo, between
 Huinqa and Maranajapata,
 on Rio Chanchan just above
 confluence of Rio Angas, Prov. Chimbo.
 railroad cut in earth
 banks

57 *Diastatia*
 common

58 *gr.*
 occasional

$2^{\circ} 13' S$
 $79^{\circ} 2' W$

flowers lavender
 not caespitose

June 3 - Guayaquil
 Left 2 boxes, one large,
 the other small, of specimens
 marked #9 & #10; with

Dr. Varas, ~~agent~~ of
 the Estacion Experimental,
 to be shipped by freight
 to the Plant Quarantine
 Station in Hoboken,
 marked with their tags.
 The boxes contain specimens

up to before #27626, but
 with one fair press-
 ful not included as
 they were not yet dry.

June 4 - Between Puerto Bolívar and Machala are mangrove swamps and at least near the road they are mixed with a large shrubby Salicornia or similar thing a meter or more tall.

Also, a large Cereus may be seen mixed with the mangrove vegetation.

Between Machala and Santa Rosa is a rather variable bushy vegetation, with occasional marshy or swampy parts. The drier parts dominated by a yellow flowered Cordia, and various morning-glories.

The region has a diverse enough vegetation to make a collecting trip here eminently worth while. It should be made at this season as everything seems to be in flower.

Beyond Santa Rosa higher ground is reached and some rather dense woods, with large trees. Near Arenillas are extensive Typha marshes surrounded by woods.

Between Arenillas and the Peruvian border the country becomes drier. A bushy species of Ipomoea with large rose-purple flowers becomes the most abundant plant. There are a great number of other things in bloom. The country changes from a savanna-like brush to just plain brush, which becomes sparser. Not far from the border there is a small marsh which appeared from a fast moving truck to contain Anemopsis.

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